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US Army Corps of Engineers
Chicago District

Lake Michigan Diversion Accounting

Water Year 1996 Report

Executive Summary

In compliance with the 1967 U.S. Supreme Court decree as modified in 1980 (hereinafter, the Decree), the WY96 diversion was computed using the best current engineering practice and scientific knowledge.

Given the complexity of the hydrologic cycle in the heavily urbanized Chicago metropolitan area, and given the number of human and other factors that cannot be adequately represented in numerical modeling procedures, the results of the simulations which compute diversion flows worked exceptionally well.

The WY96 diversion accountable to the State of Illinois is 3,108 cubic feet per second (cfs). This flow is 92 cfs less than the 3,200 cfs average specified by the Decree. The 40 year running average, rounded to the nearest cfs, beginning with WY81 is 3,418 cfs and the cumulative deviation from the 3,200 cfs average is -3,493 cfs-years. The negative cumulative deviation indicates a water allocation deficit and the maximum deficit allowed by the Decree is 2,000 cfs-years.

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Introduction

The diversion of water from the Lake Michigan watershed is of major importance to the Great Lakes states and to the Canadian province of Ontario. The states and province that border the Great Lakes have concerns with both diversions during periods of low lake levels, as well as the long term effects of diversion. To insure that the concerns of these interested parties are considered, the U. S. Army Corps of Engineers has been given the responsibility for the accounting of flow that is diverted from the Lake Michigan watershed.

The Corps of Engineers, Chicago District, is responsible for monitoring the measurements and the computation of the diversion of Lake Michigan water by the State of Illinois. Prior to the WY83 report, the calculations were made for the Illinois Department of Natural Resources - Office of Water Resources (IDNR-OWR), formerly known as the Illinois Department of Transportation - Division of Water Resources (IDOT-DWR), by the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC), formerly known as the Metropolitan Sanitary District of Greater Chicago (MSDGC). The computations for Water Year 1983 (WY83), WY84 and WY85 (1 October 1982 through 30 September 1985) were performed by the Northeastern Illinois Planning Commission (NIPC) for IDNR-OWR. The Corps reviewed, modified, and updated the WY84 and WY85 diversion accounting performed by NIPC. The computations for WY86 were performed jointly by NIPC (under contract to the Corps of Engineers) and the Corps of Engineers. Computations since then have been performed solely by the Corps of Engineers, with the exception of WY91 and WY92, which were performed jointly with Christopher B. Burke Engineering, LTD. This report represents the final Lake Michigan diversion accounting for WY96.

Authority for Report

Under the provisions of the U.S. Supreme Court Decree in the Wisconsin, et. al. v. Illinois et. al., 388 U.S. 426,87 S.Ct. 1774 (1967) as modified in 449 U.S. 48, 101 S.Ct. 557 (1980), the Chicago District of the Corps of Engineers is responsible for monitoring the measurement and computation of diversion of Lake Michigan water by the State of Illinois. The Water Resources Development Act of 1986 (Section 1142 of PL 99-662) gave the Corps total responsibility for the computation of diversion flows as formerly done by the State of Illinois. The Corps' new mission became effective on October 1, 1987.

History of the Diversion

Water has been diverted from Lake Michigan at Chicago into the Mississippi River Watershed since the completion of the Illinois and Michigan (I & M) Canal in 1848. At that time, the diversion averaged about 500 cubic feet per second (cfs). The I & M Canal was built primarily to serve transportation needs by providing a connecting watercourse between the Great Lakes and the Mississippi River system.

With the development of the Chicago metropolitan area, sewer and drainage improvements led to severe sanitation problems in the mid to late 1800's. The newly constructed sewers moved water and wastes into the Chicago River, which until 1900 drained to Lake Michigan. The water quality of Lake Michigan deteriorated and contaminated the city's primary water supply.

A second problem that occurred during this time period was an increase in the overbank flooding within the city. As more roads were built and buildings constructed, the sewer system was correspondingly expanded. The increase in impervious area from the newly constructed roads and buildings increased the rate and volume of stormwater runoff and resulted in increased flooding.

As a solution to the sanitation and flooding problems, construction of the Chicago Sanitary and Ship Canal (CSSC) was undertaken. Construction of the CSSC allowed the flow direction of the Chicago River to be reversed (Figure 1). Construction of the Chicago Sanitary and Ship Canal was completed in 1900 by the MWRDGC. The CSSC followed the course of the older I & M Canal. The CSSC is much larger than the I & M canal and can handle the Chicago River flow, as well as increased shipping. In the 1930's, the Chicago River Controlling Works (CRCW) was constructed at the mouth of the Chicago River. The CRCW regulates the amount of Lake Michigan water allowed to pass into the river and restricts river flooding from entering Lake Michigan. The water levels in the CSSC are controlled by the Lockport Lock and Dam.

Between 1907 and 1910, the MWRDGC constructed a second canal called the North Shore Channel. It extended from Lake Michigan at Wilmette in a southerly direction 6.14 miles to the north branch of the Chicago River. The Wilmette Pumping Station, also known as the Wilmette Controlling Works, regulates the amount of Lake Michigan flow allowed down the channel through the use of one vertical lift gate.

Construction of a third canal, the Calumet Sag Channel, was completed in 1922. The canal connects Lake Michigan through the Grand Calumet River, to the CSSC. The Calumet Sag Channel was constructed to carry sewage from South Chicago, Illinois and East Chicago, Indiana. Flow through the canal was controlled by the Blue Island Lock and Dam. The O'Brien Lock and Dam, which replaced the Blue Island Lock and Dam, was completed in 1967 and is located on the Calumet River. The O'Brien Lock and Dam regulates the flow of Lake Michigan waters down the Calumet Sag Channel. Figure 2 shows the affected watershed.

Background of Lake Michigan Diversion Accounting

The Decree specifies several limitations on the diversion of Lake Michigan water by the State of Illinois. The Lake Michigan diversion accountable to Illinois is limited to 3,200 cubic feet per second (cfs) over a forty (40) year averaging period. During the forty (40) year period, the average diversion in any annual accounting period may not exceed 3,680 cfs, except in two accounting periods due to extreme hydrologic conditions in which the average diversion may not exceed 3,840 cfs. During the first thirty nine (39) year period, the maximum allowable cumulative difference between the calculated diversion and 3,200 cfs is 2,000 cfs-years. These limits apply to the forty year period beginning with WY81.

Also required by the Decree, a three (3) member technical committee is convened every five (5) years to evaluate the diversion accounting program to ensure that the accounting is accomplished using the best current engineering practice and scientific knowledge.

Prior to the 1983 accounting report, diversion accounting was done by the MWRDGC in the form of monthly hydraulic reports. As required by the Decree, the diversion was calculated by deducting non-diversion flows from the Lockport record measured by MWRDGC and adding those diversion flows not discharging to the CSSC. All of the deductible flows could not be measured, therefore MWRDGC used flow records from gaged areas to obtain typical flow values. To estimate the unmeasured deductible flows, the measured flow values were extrapolated to the areas from which the deductible flows originated.

While the diversion accounting was still being performed by MWRDGC the first technical committee was convened. The committee was primarily concerned with the rating of the various components at the Lockport facility, the primary diversion measurement location (Espey et. al., 1981). In response to the Committee's concerns, the Corps' Waterways Experiment Station (WES) revised the ratings of the two sets of Lockport sluice gates (Hart and McGee, 1985).

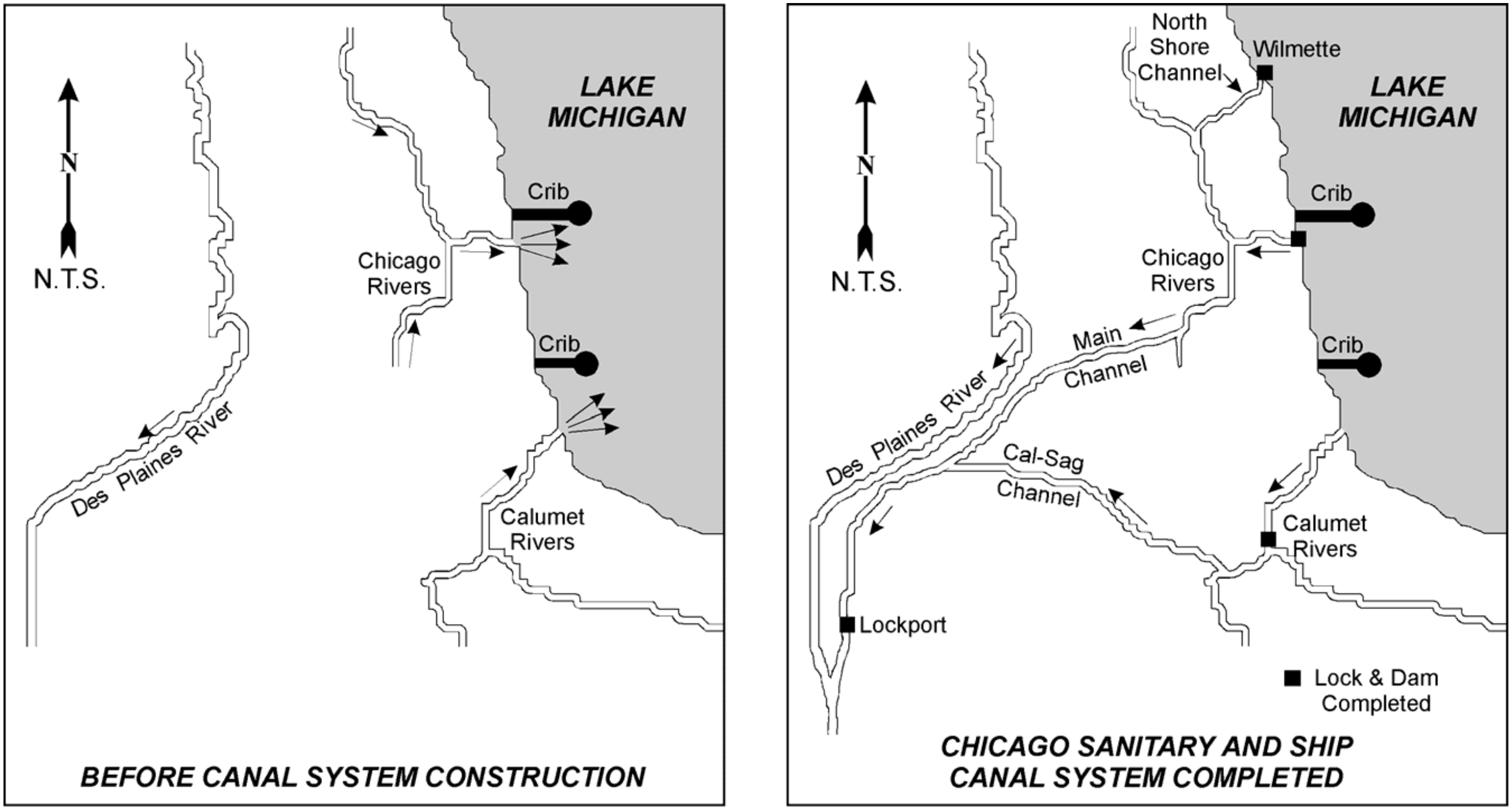


Figure 1 Development of the Chicago Sanitary and Ship Canal System

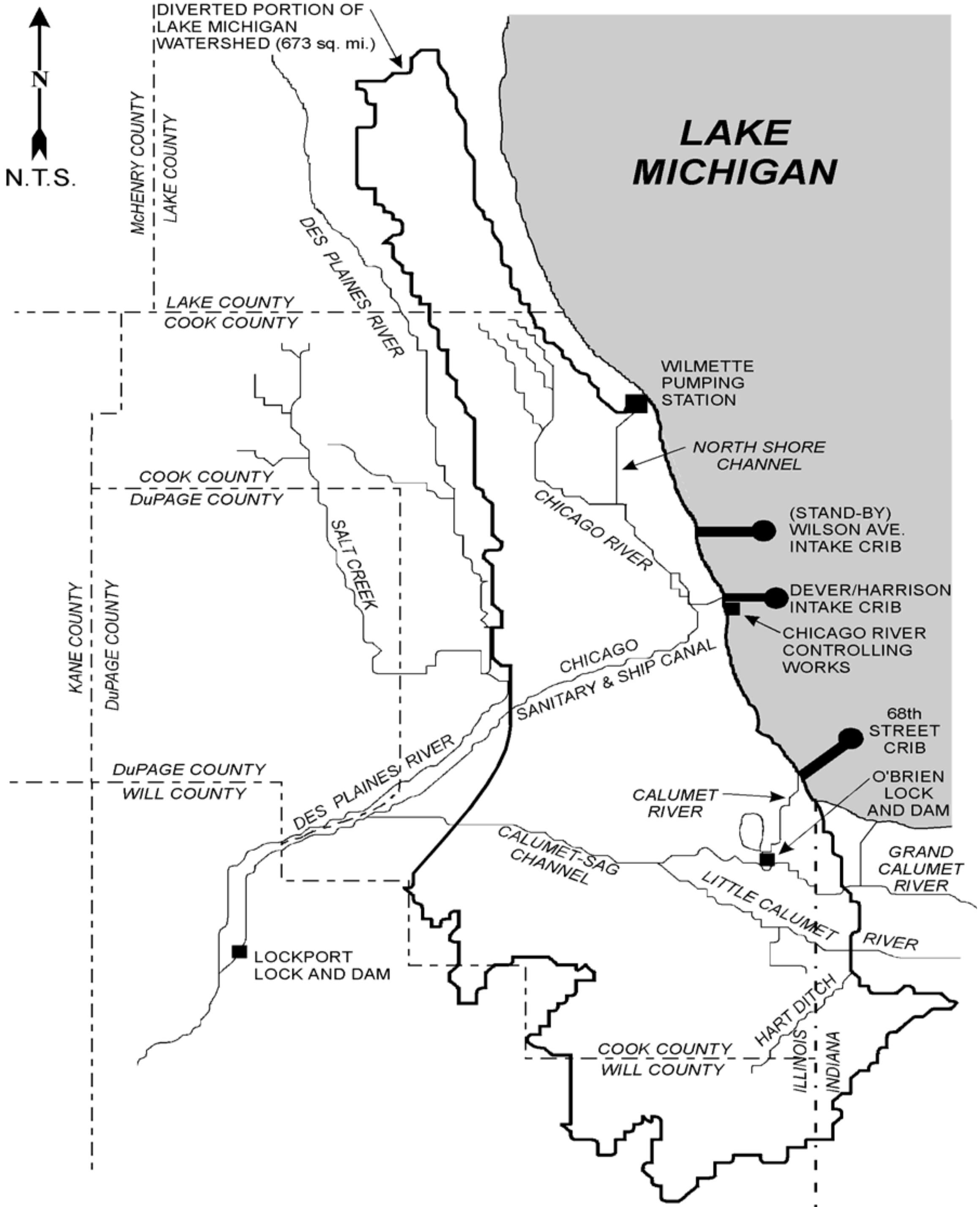


Figure 2 Location Plan - Lake Michigan Diversion at Chicago

In response to the Committee's concerns, the State of Illinois installed an acoustic velocity meter (AVM) at Romeoville five (5) miles upstream of Lockport. The AVM is a highly accurate flow measuring device that proved to provide better flow measurements than the MWRDGC reported Lockport flows and the new Corps rating curves. The AVM became operational 12 June 1984. However, USGS did not publish the AVM flows until 1 October 1985. Because of significant equipment problems with the original AVM, a replacement AVM was installed in November 1988.

Additionally, the State of Illinois contracted with NIPC to revise the diversion accounting calculations. At the same time, the State of Illinois moved from monthly hydraulic reports to annual accounting reports. NIPC adapted computer models of the diverted Lake Michigan and the Des Plaines River watersheds previously developed for studies in Northeastern Illinois under Section 208 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500), to calculate those flows that could not be measured. Like MWRDGC, NIPC deducted non-diversion flows from the Lockport record and added those flows not discharged to the canal to calculate the Lake Michigan diversion. However, NIPC modeled both the gaged and ungaged areas to calculate much of the deduction and addition flows. Then computational budgets were developed around each of the gaged areas to verify the models. The budgets aid in calibrating the models and verifying the computational procedures. Due to the more rigorous approach and the verification provided by the budgets, the procedure developed by NIPC was a significant improvement over the previous approach.

The second technical committee reviewed the NIPC hydrologic and hydraulic computer models and agreed that the approach was consistent with the requirements of the decree (Espey et. al., 1987). However, the committee felt that some of the parameters used in the models were out of date and in need of revision. To address the committee's concerns, the Corps hired a consultant (Christopher B. Burke Engineering, Ltd., (CBBEL)) in September of 1988 to review and update the modeling parameters. The final report (CBBEL, 1990) concerning the updating of modeling parameters was submitted to the Corps in October 1990.

The Water Resources Development Act of 1986 gave the Corps of Engineers the full responsibility for computation of the Illinois Lake Michigan diversion as of 1 October 1987. When the Corps' new responsibility became effective, the WY84 diversion accounting report, developed by NIPC, had not been certified. As a result, the Corps was responsible for conducting the WY84 and all subsequent reports.

NIPC completed the WY84 diversion accounting analysis in April 1987 and the report was subsequently reviewed by the Corps. The Corps found the report to be adequate with two exceptions. First, the accounting was completed with the model parameters questioned by the second technical committee. Second, the MWRDGC Lockport flows, which were adjusted using the WES rating curves, were used rather than the AVM flows. The Corps, knowing that the modeling parameters required updating and that AVM flows for the period prior to installation could be calculated accurately using regression equations, refrained from certifying the WY84 report until these issues were resolved.

NIPC completed the WY85 diversion accounting report in December 1988 and the report was reviewed by the Corps. Like the WY84 report, the WY85 accounting was done with the modeling parameters questioned by the second technical committee. Additionally, NIPC used the AVM flows published by the USGS in their WY85 Water Resources Data for Illinois report. Since the publication of the WY85 USGS report, more reliable regression equations have been developed for calculating flows when the AVM was malfunctioning. These equations provide flow estimates based on flow components at Lockport. The equations are used to fill in missing records when the AVM malfunctions.

Over the years, various regression analyses have been performed to relate the MWRDGC reported Lockport flows to the AVM flows. Several sets of equations were proposed by the Corps of Engineers, the United States Geological Survey (USGS), Harza Engineering Co., and the Second Technical Committee. The report, *Chicago Sanitary and Ship Canal at Romeoville Acoustical Velocity Meter Backup System*, was completed September 1989 (USACE, 1989). The report documents the many efforts taken by various parties to develop useful regression equations. The regression equations that were ultimately used to estimate missing AVM flows from WY86 through WY96 were developed by the USGS in a report titled *Comparison, Analysis, and Estimation of Discharge Data from Two Acoustic Velocity Meters on the Chicago Sanitary and Ship Canal at Romeoville, Illinois* (USGS, 1994). This report is contained in the Lake Michigan Diversion Accounting WY93 Annual Report.

Upon completion of the analysis of the modeling parameters by CBBEL, the WY84 and WY85 diversion flows were recalculated using the revised modeling parameters and the Romeoville AVM flows. The diversion flows were certified by the Corps and transmitted to all interested parties in the Lake Michigan Diversion Accounting 1989 Annual Report (USACE, 1990).

The computation of Illinois' diversion from Lake Michigan for WY86 was undertaken as a joint effort between NIPC (under contract to the Corps) and the Corps. The computation of Illinois' diversion from Lake Michigan for WY87 through WY90 was performed solely by the Corps.

Prior to the publication of the WY90 diversion accounting report, the third technical committee reviewed diversion accounting procedures and efforts to meet the recommendations of the first and second committees (Espey et. al., 1994). The committee expressed general satisfaction with the procedures and efforts to meet the recommendations of the previous committees. Emphasis was placed on the need for data and model quality plans, detailed accounting procedures, and more timely reports. Also recommended by the committee were detailed flow measurements at the lakefront structures and at the Upper Des Plaines Pump Station.

The WY91 and WY92 diversion accounting was performed as a joint effort between CBBEL (under contract to the Corps) and the Corps. The WY93, WY94, WY95 and WY96 accounting was performed solely by the Corps.

The WY86 through WY89 Diversion Accounting Reports are contained in the Lake Michigan Diversion Accounting Annual Report covering WY90 through WY92 (USACE, 1994). The WY90 Diversion Accounting Reports are contained in the Lake Michigan Diversion Accounting Water Year 1993 Annual Report (USACE, 1994). The WY91 and WY92 Diversion Accounting Reports are contained in the LMDA Water Year 1994 Annual Report (USACE, 1996). The WY93 and WY94 Diversion Accounting Reports are contained in the Lake Michigan Diversion Accounting Water Year 1995 Annual Report. The WY95 Diversion Accounting Report is contained in the Lake Michigan Diversion Accounting Water Year 1996 Annual Report (USACE, 1998).

The primary revision implemented for the WY90 diversion accounting was the incorporation of the new 25-gage precipitation network into the runoff simulation models. The 25-gage precipitation network replaces the previously used 13-gage network. The new precipitation network has solved many of the problems associated with the old network, such as poor exposure and distribution patterns. The Illinois State Water Survey (ISWS) installed and maintains the precipitation network for the Corps of Engineers. They also collect the data and adjust it if necessary. A description of the new 25-gage precipitation network can be found in the ISWS report titled *Installation and Operation of a Dense Raingage Network to Improve Precipitation Measurements for Lake Michigan Diversion Accounting: Water Year 1990* (ISWS, 1991). That report is contained in the Lake Michigan Diversion Accounting WY93 Annual Report.

In addition to the introduction of the new 25-gage precipitation network were the subsequent modifications to the hydrologic runoff models and hydraulic sewer routing models. These models were revised in order to reflect the changes in the precipitation network and changes in land use and cover. Many of the model changes were completed by Rust Environment and Infrastructure under contact with the Corps. Their work culminated in a report titled *Diversion Accounting Update for the New 25-Gage Precipitation Network* (Rust, 1993). That report is also contained in the Lake Michigan Diversion Accounting WY93 Annual Report.

Rust's work involved reviewing and correcting map delineations of combined sewer special contributing areas, delineating precipitation gage assigned areas for the 25-gage network, land-use/land-cover delineation, modifying the hydraulic sewer routing model to reflect the revised precipitation network and land cover assignments, and assessing the model parameters used in the hydrologic runoff model, Hydrologic Simulation Program - FORTRAN (HSPF).

The Corps modified the hydraulic sewer model, Special Contributing Area Loading Program (SCALP), in the separate sewer areas in order to incorporate changes in the precipitation network. These changes were also incorporated in the WY90 accounting. Since actual boundaries have not been mapped for those areas, some assumptions as to the location of the separate sewer areas were made. These assumptions were necessary since effective (instead of actual) areas are used for separate sewer areas in the SCALP model. These assumptions will continue until a further study can be accomplished that will reflect actual boundaries for these separately sewered areas. These modifications were also incorporated into accounting procedures beginning with the WY90 accounting.

A study was also done by the Corps to improve the response of the HSPF hydrologic runoff models. Input on parameter improvements were received from NIPC and Rust. The study resulted in some minor parameter modifications to the HSPF runoff model to correct for past inconsistencies and improve parameter accuracy.

Beginning with the WY91 accounting all the computer models were revised to read and write to the Data Storage System (DSS) database, the Corps' standard database. In 1993 Aqua Terra Consultants, under contract to the Corps, revised the HSPF code to be compatible with the DSS database and in 1994 they provided a new release of HSPF, version 11. Christopher B. Burke Engineering in 1995 revised all hydrologic and computational HSPF input files, as well as SCALP input files to work in conjunction with the DSS database. The Corps revised the SCALP code to also work in conjunction with this database.

Beginning with the WY92 accounting, flows in the Grand Calumet were measured instead of estimated through regression equations. These flows are critical in determining portions of the deductible water supply from Indiana contained in Column 5 of the report.

There were three primary revisions to the accounting procedures beginning with the WY93 accounting. The first revision involved a modification to the procedure for estimating the deductible Indiana water supply pumpage contained in the Grand Calumet River. This revision better accounts for the unique hydraulics of this river. The second revision involved modeling modifications for a portion of the

Des Plaines TARP system that became operational in June 1993. These modeling modifications impact the deductible runoff from the Des Plaines River watershed contained in Column 6. The third revision to the accounting involved adjustments to correct for double accounting for a portion of the runoff originating from the ungaged Calumet watershed. This modification is reflected only in the results of Column 12, Runoff from the Diverted Lake Michigan Watershed, and therefore has no effect on the computed diversion.

Additional revisions to the accounting procedures were implemented in WY96. These revisions are detailed in this report in the section titled “WY96 Revisions to Diversion Accounting Procedures”.

Diversion Accounting Procedures

The Lake Michigan diversion accountable to the State of Illinois is calculated by using the AVM measured flow in the CSSC at Romeoville and deducting flows that do not constitute Lake Michigan diversion and are not accountable to the State of Illinois. Finally, additions are made to the Romeoville record for diversions that are not discharged to the canal. The deductions include groundwater water supply pumpage whose effluent is discharged to the canal, Lake Michigan water supply pumpage from Indiana discharged to the canal, runoff from the Des Plaines River watershed discharged to the canal, and water supply pumpage from Lake Michigan used for Federal facilities discharged to the canal. The additions to the Romeoville record include flows diverted from the canal upstream of Romeoville, and Lake Michigan water supply whose effluent is not discharged to the canal. This procedure represents the accounting method required by the Supreme Court Decree.

The diversion accounting results are presented as a series of columns that are listed in Table 1. Column 1 through Column 3 compute the total flow in the CSSC. Column 4 through Column 7 presents the deductions from the canal system flows with the total deduction being presented in Column 8. Column 9 presents the additions to the canal system record. Column 10 is the computed Lake Michigan diversion accountable to Illinois and is equal to the canal system flow minus the deductions plus the additions. Columns 11 through 13 are independent flow estimates for the three sources of diversion: water supply pumpage from Lake Michigan, runoff from the diverted Lake Michigan Watershed, and direct diversion through the lakefront structures. Column 11 through Column 13 are not used in the diversion calculation but are included as another estimate of the diversion for verification of the accounting flows in Column 10. The sum of Columns 11 through 13 should theoretically equal the flow in Column 10 with one exception. The flows in Column 11 do not account for consumptive losses.

In addition to the diversion calculations presented in the 13 columns, 14 computational budgets are prepared as input to the diversion calculation and to verify the estimated flows that cannot be measured. A summary of these budgets is presented in Table 2. Budgets 1 and 2 do not compare simulated to measured flows but are summations of critical water supply pumpage data. Budget 3 through Budget 6 partition stream gage records into runoff and sanitary/industrial discharge components to estimate a portion of the runoff from the diverted watershed that is used as input to Column 12, Runoff from the Diverted Lake Michigan Watershed. Budget 7 through Budget 13 compare simulated to measured flows at MWRDGC facilities. These budgets simulate all the deductible Des Plaines River Watershed contained in Column 6 and the deductible groundwater seepage into TARP contained in Column 4. These budgets also are used for verification of the diversion accounting procedures and give an indication of the accuracy of the diversion accounting models. Budget 14 compares canal system inflows and outflows. It is used primarily as a verification of modeling results as well as an indicator of the accuracy and completeness of measured/reported flows.

Table 1

Description of the Diversion Accounting Columns

Column	Description
1	Chicago Sanitary and Ship Canal (CSSC) at Romeoville AVM Gage Record
2	Diversion from the CSSC above the Romeoville AVM Gage
3	Total Flow Through the CSSC
4	Groundwater Pumpage Discharged into the CSSC and Adjoining Channels
5	Water Supply Pumpage from Indiana Reaching the CSSC
6	Runoff from the Des Plaines River Watershed which Reaches the CSSC
7	Lake Michigan Pumpage by Federal Facilities which Discharge to the CSSC and Adjoining Channels
8	Total Deduction from the CSSC Romeoville AVM Gage Record
9	Lake Michigan Pumpage Which is not Discharged into the CSSC
10	Total Diversion Accountable to the State of Illinois
11	Pumpage from Lake Michigan Which is Accountable to the State of Illinois
12	Runoff from the Diverted Lake Michigan Watershed
13	Direct Diversions Through Lakefront Control Structures Accountable to the State of Illinois

Table 2
Description of the Diversion Accounting Computational Budgets

Budget Number	Title	Description
1	Diverted Lake Michigan Pumpage	This budget sums the Lake Michigan water diverted by the State of Illinois in the form of Industrial and Municipal water supply. The results of this budget are used in Column 11.
2	Groundwater Discharged to the CSSC	This budget sums groundwater pumpages that are discharged to the CSSC. The results of this budget are used in Column 4.
3	North Branch Chicago River at Niles, IL	This budget performs a simple separation of stream flow into sanitary and runoff portions. The results of this budget are used in Budget 14 and Column 12.
4	Little Calumet River at the IL-IN State Line	This budget performs a simple separation of stream flow into sanitary and runoff portions. The results of this budget are used in Budget 14 and Column 12.
5	Thorn Creek at Thornton, IL	This budget performs a simple separation of stream flow into sanitary and runoff portions. The results of this budget are used in Budget 14 and Column 12.
6	Little Calumet River at South Holland, IL	This budget performs a simple separation of stream flow into sanitary and runoff portions. The results of this budget are used in Budget 14 and Column 12.
7	MWRDGC Northside Water Reclamation Plant	This budget performs hydrologic and hydraulic simulation of the service basin tributary to the MWRDGC Northside Water Reclamation Facility. The simulations estimates the runoff from portions of the Lake Michigan and Des Plaines River watersheds within the Northside service basin that is diverted to the CSSC in the form of inflow-infiltration. The budget provides an internal verification of the accounting procedures. The results of this budget are used in Budget 14 and Columns 6 and 12.
8	Upper Des Plaines Pumping Station	This budget performs hydrologic and hydraulic simulation of the MWRDGC Upper Des Plaines Pumping Station. This budget provides a calibration point to verify models of the Des Plaines River watershed
9	MWRDGC Mainstream TARP Pumping Station	This budget performs hydrologic and hydraulic simulation of the MWRDGC Mainstream TARP Pumping Station. The results of this simulation are used in Budgets 10 and 14 and Columns 6 and 12. The budget also provides internal verification of the accounting procedures.
10	MWRDGC Stickney Water Reclamation Facility	This budget performs hydrologic and hydraulic simulation of the service basin tributary to the MWRDGC Stickney Water Reclamation Facility. The simulations estimates the runoff from portions of the Lake Michigan and Des Plaines River watersheds within the Stickney service basin that is diverted to the CSSC in the form of inflow-infiltration. The budget provides an internal verification of the accounting procedures. The results of this budget are used in Budget 14 and Columns 6 and 12.
11	MWRDGC Calumet TARP Pumping Station	This budget performs hydrologic and hydraulic simulation of the MWRDGC Calumet TARP Pumping Station. The results of this simulation are used in Budgets 12 and 14 and Columns 6 and 12. The budget also provides internal verification of the accounting procedures.
12	MWRDGC Calumet Water Reclamation Facility	This budget performs hydrologic and hydraulic simulation of the service basin tributary to the MWRDGC Calumet Water Reclamation Facility. The simulations estimates the runoff from portions of the Lake Michigan and Des Plaines River watersheds within the Calumet service basin that is diverted to the CSSC in the form of inflow-infiltration. The budget provides an internal verification of the accounting procedures. The results of this budget are used in Budget 14 and Columns 6 and 12.
13	MWRDGC Lemont Water Reclamation Facility	This budget performs hydrologic and hydraulic simulation of the service basin tributary to the MWRDGC Lemont Water Reclamation Facility. The simulations estimates the runoff from portions of the Des Plaines River watershed within the Lemont service basin that is diverted to the CSSC in the form of inflow-infiltration. The budget provides an internal verification of the accounting procedures. The results of this budget are used in Budget 14 and Column 6.
14	Chicago Canal System	This budget performs a water balance of the Chicago Canal System which includes the CSSC and adjoining channels. This budget provides a verification point for the accounting procedures.

WY96 Revisions to Diversion Accounting Procedures

Four revisions were made to the diversion accounting procedures for WY96. First, a switch to using Argonne National Lab's direct solar radiation values was made because O'Hare Airport changed the way it reported cloud cover. A second revision was the improvement of the snowmelt computation by incorporating the newly available 3-hour meteorologic data at O'Hare Airport. Previously snowmelt was computed using daily values. Thirdly, the Calumet TARP model was updated to include new tunnel legs which went on-line during WY96. Finally, University of Chicago air temperature data is no longer used as input to HSPF due to the fact that records are no longer kept at the site.

The use of direct solar radiation at Argonne instead of using meteorologic data at O'Hare to calculate solar radiation was necessary due to a change in the reporting of cloud cover at O'Hare. Solar radiation data is used in the calculation of potential evapotranspiration (PET) along with the simulation of snowmelt. The cloud cover at O'Hare Airport historically had been reported based on manual observations using a single value to capture the "dawn-to-dusk" cloud cover. Beginning in WY96, the reporting of cloud cover changed to 3-hour ASOS (Automated Surface Observations System) readings reported on the climatological data sheets. In addition, the values reported were changed from a numeric value ranging from 1 to 10 to a written descriptor of the cloud cover condition. Because of the change to 3-hour ASOS reporting, the O'Hare Airport cloud cover data was not directly importable into the existing HSPF routines for calculating solar radiation. Instead, Argonne's direct measurements of daily solar radiation were used in the computation of PET. Argonne has an Eppley pyranometer which directly measures solar radiation. These measurements, along with other meteorologic data, are posted on the Argonne National Labs internet site and are downloaded for use in diversion accounting. Missing Argonne hourly solar radiation data was filled in using a correlation with available St. Charles direct solar radiation data. PET is computed on a daily basis using daily Argonne solar radiation, daily O'Hare Airport dew point, daily O'Hare Airport wind run values and daily maximum and minimum temperatures at O'Hare Airport. The daily PET value is then distributed into an hourly PET value using the previously established HSPF routine.

The snowmelt computation was improved in WY96 by incorporating hourly data. Previously snowmelt was computed using daily values from O'Hare Airport. In WY96 the O'Hare Airport climatological data sheets began to report 3-hour values for dew point, wind, temperature and cloud cover – which were previously reported only on a daily basis. This 3-hour data was transformed into hourly data (by direct interpolation) for use in improving the snow melt computations. In addition, the hourly solar radiation values, directly measured at Argonne Labs as discussed above, were also used in the computation of snowmelt.

The Calumet TNET model was also changed to reflect updates that CBBEL made under contract (CBBEL, 1999). These changes included tunnel geometry (slope, inverts, diameters, lengths, roughness) as well as adding new tunnel segments to account for tunnel reaches that have since been put in service. These new tunnel reaches (Indiana Ave, 140th St., and Markham) apparently were connected during WY95, although the associated dropshafts were not operational. For WY96, the new tunnel reaches were incorporated for the whole water year. The new dropshafts associated with the new tunnels were not activated in the TNET model until April 1, 1996, the approximate date at which MWRD physically activated them. In addition, information from MWRD indicated that many of the dropshafts which were previously modeled as gated were truly ungated. Although some of the dropshafts are ungated, there are orifice plates on most of them to restrict their flow, but many of them are open all the time – just in a restricted fashion. These changes were incorporated into the WY96 TNET model.

Finally, University of Chicago air temperature data is no longer used as input to HSPF – this was also the case for the WY95 accounting. This is due to the fact that records are no longer kept at this site. Thiessen polygon areas for precipitation gages that referenced University of Chicago air temperature in the hydrologic (HSPF) modeling were revised such that the closest of the three remaining air temperature gages (O'Hare Airport, Midway Airport and Park Forest) was used in the modeling.

Accounting Results

The WY96 diversion accounting monthly summary is presented in Table 4. Table 4 shows the total WY96 Lake Michigan diversion accountable to the State of Illinois is 3,108 cfs (Column 10). This diversion is 92 cfs less than the 3,200 cfs average specified by the Decree. The 40 year running average (Table 3), rounded to the nearest cfs, beginning with WY81 is 3,418 cfs and the cumulative deviation from the 3,200 cfs average is -3,493 cfs-years. The negative cumulative deviation indicates a water allocation deficit. The maximum allowable deficit is 2,000 cfs-years. Tabular data on daily diversion flows is presented in Appendix A.

Table 3

Status of the State of Illinois' Diversion from Lake Michigan Under the 1980 Modified U.S. Supreme Court Decree

Accounting Year	Flow (cfs)	Average (cfs)	Deviation (cfs-yrs)
1981	3,106	3,106	94
1982	3,087	3,097	207
1983	3,613	3,269	-206
1984	3,432	3,310	-438
1985	3,472	3,342	-710
1986	3,751	3,410	-1,261
1987	3,774	3,462	-1,835
1988	3,376	3,451	-2,011
1989	3,378	3,443	-2,189
1990	3,531	3,452	-2,520
1991	3,555	3,461	-2,875
1992	3,409	3,457	-3,084
1993	3,841	3,487	-3,725
1994	3,064	3,456	-3,589
1995	3,197	3,439	-3,586
1996	3,108	3,418	-3,493

	Certified	Running	Cumulative

Table 4
Lake Michigan Diversion Accounting - WY1996
Summary of Diversion Flows (All in cfs)

LAKE MICHIGAN DIVERSION ACCOUNTING WY 1996	ROMEOVILLE AVM GAGE RECORD	DIVERSIONS ABOVE THE GAGE	TOTAL FLOW THROUGH THE CANAL	GROUNDWATER PUMPAGE DISCHARGED INTO THE CANAL	WATER SUPPLY PUMPAGE FROM INDIANA REACHING THE CANAL	RUNOFF FROM THE DES PLAINES RIVER WATERSHED REACHING THE CANAL	LAKE MICHIGAN PUMPAGE BY FEDERAL FACILITIES DISCHARGED TO THE CANAL	TOTAL DEDUCTION FROM THE ROMEOVILLE GAGE RECORD	LAKE MICHIGAN PUMPAGE NOT DISCHARGED TO THE CANAL	**TOTAL DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS**	PUMPAGE FROM LAKE MICHIGAN ACCOUNTABLE TO THE STATE OF ILLINOIS	RUNOFF FROM THE DIVERTED LAKE MICHIGAN WATERSHED	DIRECT DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS
DATE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Oct-95	2,633.4	2.2	2,635.6	96.8	20.4	102.2	7.0	226.4	240.4	**2,649.6**	1,724.7	472.1	464.1
Nov-95	3,035.2	1.1	3,036.3	107.8	18.8	230.4	7.9	364.9	223.5	**2,894.9**	1,634.6	1,268.5	73.5
Dec-95	1,964.3	2.0	1,966.3	67.8	18.4	60.4	6.8	153.4	225.4	**2,038.3**	1,649.8	177.3	75.4
Jan-96	2,251.6	1.9	2,253.5	96.8	18.1	136.5	6.8	258.2	176.3	**2,171.6**	1,623.0	505.5	82.8
Feb-96	2,192.4	2.5	2,194.9	79.8	18.7	83.5	7.5	189.5	236.4	**2,241.8**	1,714.1	354.6	84.6
Mar-96	2,186.5	2.2	2,188.7	86.7	19.0	96.6	6.2	208.5	223.7	**2,203.9**	1,650.9	406.6	78.0
Apr-96	2,604.0	1.8	2,605.8	90.6	18.3	124.0	6.3	239.2	232.0	**2,598.6**	1,648.1	641.7	97.6
May-96	4,670.4	1.8	4,672.2	121.2	22.0	308.4	7.1	458.7	242.1	**4,455.6**	1,696.5	2,285.3	200.2
Jun-96	4,563.7	1.4	4,565.1	119.3	35.3	328.9	7.6	491.1	261.1	**4,335.1**	1,860.1	1,580.7	536.8
Jul-96	4,770.2	1.9	4,772.1	110.8	44.1	450.5	9.2	614.6	333.6	**4,491.1**	2,116.4	1,902.1	771.5
Aug-96	3,446.2	3.3	3,449.5	77.9	48.7	76.8	9.4	212.8	312.1	**3,548.8**	2,135.3	358.0	1,032.9
Sep-96	3,606.2	2.9	3,609.1	98.1	35.8	119.0	8.9	261.8	291.3	**3,638.6**	1,924.6	616.2	1,036.4
Averages	3,162.4	2.1	3,164.5	96.1	26.5	176.7	7.6	306.9	249.9	**3,107.5**	1,782.0	882.0	378.8

Computations:

1. Column 3 equals the sum of Columns 1 and 2.
2. Column 8 equals the sum of Columns 4 through 7.
3. Column 10 = Column 3 - Column 8 + Column 9.

Note: The averages presented in the final row are calculated from the daily values contained in Appendix A.

Deductions from the Romeoville Gage Record

Additions to the Romeoville Gage Record

Discussions of Results

The following is a discussion of the column functions and computational budgets. The discussion of the column functions describes the purpose of each column, as well as some observations on the WY96 values in the columns. The discussion of the computational budgets presents the purpose of each budget and the results of the budget flow balances. The results of the computational budgets are used in the diversion calculations where seven (7) budgets are used to verify the diversion simulation models. The columns are discussed first, followed by the discussion of the budgets.

Columns

The first ten (10) columns display the components of the diversion calculation and include the Romeoville flow, as well as the various deductions and additions to the Romeoville record. The final three (3) columns (Columns 11 through 13) display the three (3) diversion components (Lake Michigan pumpage accountable to Illinois, runoff from the diverted watershed, and direct diversion through the lakefront control structures). The sum of Columns 11 through 13 should theoretically equal the Romeoville based diversion calculation. A comparison of the sum of these three (3) columns to the calculated diversion (Column 10) is presented in the discussion of Column 11 through Column 13.

Column 1: Chicago Sanitary and Ship Canal (CSSC) at Romeoville, USGS AVM Gage Record

The discharge at Romeoville for WY96 was 3,162.4 cfs (based on an average of WY96 daily flows). For the twenty-four (24) days when the AVM was inoperable, the flow at the Romeoville site was calculated from the USGS regression equations.

Column 2: Diversions from the CSSC Above the Gage

Argonne Laboratories and Citgo Petroleum Corporation were the only diversions from the CSSC upstream of the Romeoville gage in WY96. The average withdrawal upstream of the AVM for WY96 was 2.1 cfs.

Column 3: Total Flow Through the CSSC

Column 3 is the sum of Column 1 and Column 2 and represents the total flow entering the canal system. The average CSSC flow was 3,164.5 cfs for WY96.

Column 4: Groundwater Discharged to the CSSC And Adjoining Channels

Column 4 is groundwater pumpage by communities, industrial users and other private users whose effluent is discharged to the CSSC. The groundwater pumpage data is reported by the Illinois State Water Survey (ISWS). It also includes the groundwater seepage into the TARP systems discharged to the CSSC. This quantity is determined by summing all reported groundwater pumpages tributary to the CSSC, along with the estimated groundwater seepage into the Mainstream and Des Plaines TARP (Budget 9) and Calumet TARP (Budget 11) systems. This total is then adjusted by subtracting the portion of groundwater present in the combined sewer overflows (CSO's) discharged to the Des Plaines River and other watercourses not tributary to the CSSC. This groundwater would normally have been discharged to the canal via treated sewage effluent had a CSO event not occurred. This method prevents double accounting of the combined sewer overflow portion of the groundwater supply pumpage.

Using ISWS groundwater records, groundwater pumpages were assumed to reach the CSSC and adjoining channels if they were located in the diverted Lake Michigan watershed in Illinois or if they were located within MWRDGC Water Reclamation Plant (WRP) service boundaries which discharged into the CSSC and adjoining channels. Groundwater seepage into the Mainstream and Des Plaines TARP systems and the Calumet TARP system was determined through simulation and is discussed in Budgets 9 and 11. The groundwater constituent of CSO's is determined entirely thorough simulation.

According to the Supreme Court Decree of 1967, groundwater pumpage from the Lake Michigan watershed whose effluent is discharged to the CSSC is a deduction, except to the extent that these groundwater sources are supplied by infiltration from Lake Michigan. Current piezometric levels indicate that groundwater is discharging to the lake, therefore, groundwater pumpage from within the Lake Michigan watershed that reaches the canal continues to be a deduction. Research literature will be reviewed periodically to verify this assumption, and to identify any changes that would indicate that Lake Michigan is recharging groundwater sources as a result of groundwater pumping.

Column 4 represents a deduction from the Romeoville record and averaged 96.1 cfs. This flow is an increase of 3.8 cfs from WY95. Groundwater pumpage tributary to the canal is composed of 21.1 cfs of groundwater pumpage from the Lake Michigan watershed, 16.1 cfs of groundwater pumpage from outside of the Lake Michigan watershed, 49.5 cfs of groundwater seepage into the Mainstream and Des Plaines TARP systems, and 9.5 cfs of groundwater seepage into the Calumet TARP system. The total of these components is 96.1 cfs, which equals the deduction from the Romeoville gage record. In most years, a small portion of this groundwater supply pumpage (normally tributary to CSSC) is determined, through simulation, to be discharged to the Des Plaines River and other watercourses not tributary to the CSSC in the form of CSO's. The groundwater portion of these CSO's are then subtracted from the groundwater deduction of Column 4.

Column 5: Water Supply Pumpage from Indiana Reaching the CSSC

Column 5 represents the computation of Indiana water supply reaching the canal through the Grand Calumet and the Little Calumet Rivers. In the case of the Little Calumet River, a drainage divide exists east of the confluence with Hart Ditch. Therefore, flows from Hart Ditch, including virtually all dry weather flows, normally flow westward into Illinois. Under high flow conditions, the drainage divide may shift westward and a portion of the Hart Ditch flows may be diverted eastward to Burns Ditch and ultimately to Lake Michigan. However, it is believed that the occurrence in the shift in the drainage divide is infrequent and the flow that is diverted eastward is insignificant. Therefore, it is assumed that all effluent discharged into Hart Ditch and the Little Calumet River west of the divide flows westward. For WY96, total flow in the Little Calumet River was 86.3 cfs with 6.7 cfs of that flow determined to be Indiana water supply.

The Grand Calumet River has a summit. On one side of the summit the flow is toward Lake Michigan, on the other side of the side of the summit the flow is toward the Calumet Sag Channel which flows into the CSSC. However, the location of the summit is variable and highly influenced by Lake Michigan levels (USGS, 1984). Thus the calculation of this deduction from the Romeoville record is also influenced by Lake Michigan levels. Beginning with the WY92 accounting, Grand Calumet River flow was measured by a gage that was installed in 1991 that began officially measuring flows on 1 October 1991.

Flow in the Grand Calumet River contains a very high proportion of treatment plant discharge. Through WY92, the flow in the Grand Calumet River attributed to Indiana water supply pumpage was set to the sum of water supply for East Chicago, Whiting, and Hammond (whose pumpage includes water supply for Munster, Highland and Griffith). This method is an oversimplification of the actual conditions. Chicago District developed a reconnaissance level, unsteady state model of the river for the United States Environmental Protection Agency (US EPA). From this model, relationships were developed to proportion the treatment plant discharge into the flow to the CSSC and Lake Michigan. The flow summit generally occurs at the Hammond outfall or between the Hammond and East Chicago outfalls.

The equations below determine the percentage of flow from each treatment plant flowing west to the CSSC based on Lake Michigan water level:

For CCD < 0.3 ft

$$\text{Flow} = 0.45 * HW$$

For CCD >= 0.3 ft and CCD < 1.5 ft

$$\text{Flow} = (0.22 * CCD^{3} - 0.15 * CCD^{2} + 0.06 * CCD + 0.45) * HW$$

For CCD <= 1.5 ft and CCD < 1.8 ft

$$\text{Flow} = HW + (CCD - 1.5) / 0.3 * EC$$

For CCD > 1.8 ft

$$\text{Flow} = HW + EC$$

Where CCD is the lake level in feet (Chicago City Datum) measured at Calumet Harbor, HW is the daily combined water supply pumpage by Hammond and Whiting, and EC is the daily water supply pumpage by East Chicago.

The total Grand Calumet flow reaching Illinois in WY96 was measured as 36.3 cfs. Of that, 19.8 cfs was determined to be water supply pumpage. Therefore, the total WY96 Indiana water supply deduction, including the flow from the Little Calumet and Grand Calumet Rivers is 26.5 cfs. This flow is 8.0 cfs less than the Indiana water supply deduction for WY95, which was 34.5 cfs.

Column 6: Runoff from the Des Plaines River Watershed Reaching the CSSC

The WY96 average discharge of Des Plaines River watershed runoff reaching the canal (Column 6) is 176.7 cfs. This deduction is determined almost entirely through simulation. The runoff is composed of two elements, surface runoff and subsurface runoff. Surface runoff that enters sewers is referred to as inflow, while subsurface runoff is referred to as infiltration. The infiltration and inflow from the Des Plaines River watershed discharged to water reclamation plants tributary to the CSSC is 95.3 cfs, the infiltration and inflow reaching the canal through CSO's is 12.9 cfs and the runoff from the Lower Des Plaines and Summit Conduit areas is 68.4 cfs. The deduction is also influenced by the O'Hare basin flow transfer that contributed 8.7 cfs of the 95.3 cfs of runoff to the water reclamation facilities during WY96. The deductible Des Plaines River watershed runoff increased 8.9 cfs from WY95 to WY96.

Column 7: Lake Michigan Pumpage by Federal Facilities Which Discharge to the CSSC

Column 7 represents Lake Michigan diversions for Federal use, not chargeable to the State of Illinois, and is typically comprised of water supply pumpage used by federal facilities. Also included is emergency navigation makeup water used for federal purposes. Column 7 represents a deduction from the Romeoville record and the total amount of the WY96 deduction is 7.6 cfs.

Column 8: Total Deductions from the CSSC Romeoville Gage Record

Column 8 is the sum of Columns 4, 5, 6, and 7 and represents the total deduction from the Romeoville record. The total deduction for WY96 is 306.9 cfs.

Column 9: Lake Michigan Pumpage Not Discharged to the CSSC

This column represents water supply pumpage from Lake Michigan that is not discharged to the canal. The water supply pumpage not discharged to the canal is composed of two components:

- Lake Michigan water supply used by communities serviced by water reclamation facilities that do not discharge to the CSSC (249.2 cfs). This flow decreased 5.3 cfs from WY95.

- The Lake Michigan domestic water supply portion of CSO's bypassing the AVM from areas whose water reclamation facility discharge to the CSSC or its tributaries (0.7 cfs).

The communities that make up the flow in the first component are suburbs whose treated effluent is discharged to the Des Plaines River and other watercourses not tributary to the CSSC. The water supply agencies or communities are:

- Northwest Suburban Joint Action Water Agency (NWJAWA) - Member communities include Elk Grove Village, Hanover Park, Hoffman Estates, Mount Prospect, Rolling Meadows, Schaumburg and Streamwood.

- Northwest Water Commission - Member communities include Arlington Heights, Buffalo Grove, Palatine, Prospect Heights and Wheeling.

- Central Lake County Joint Action Water Agency (CLCJAWA) - Member communities include Grayslake, Gurnee, Lake County Public Works Department

(Vernon Hills and Wildwood-Gages Lake), Libertyville, Mundelein, Round Lake, Round Lake Park and Round Lake Beach.

- Lake County Public Water District - Member communities include Illinois Beach State Park, Winthrop Harbor and Zion.

- Du Page Water Commission - Member communities include Addison, Bensenville, Bloomingdale, Carol Stream, Citizen's Utilities (Arrowhead, Country Club Highlands, Lombard Heights and Valley View), Clarendon Hills, Darien, Downers Grove, Elmhurst, Glen Ellyn, Glendale Heights, Hinsdale, Itasca, Lisle, Lombard, Naperville, Oak Brook, Roselle, Villa Park, Westmont, Wheaton, Willowbrook, Wood Dale, Woodridge, and the DuPage County Water Works (Farmington, Glen Ellyn Heights, Hinsdale, Lake in the Woods, Rosewood Trace, Steeple Run).

- Lincolnshire

- Riverwoods

- Waukegan

- Lake County - Bradley Road

The communities of North Chicago and Des Plaines are separated into the percentage of each community that is not tributary to the Chicago River System.

- North Chicago - 76 percent

- Des Plaines - 38.2 percent

The communities of Lake Bluff and Knollwood-Roundout (who receive their water from CLCJAWA) are not included in Column 9, as they discharge their effluent into the Chicago River System.

It should also be noted that the Lake Michigan water supply component of the O'Hare flow transfer is subtracted from the total Lake Michigan water supply of the above communities since:

- The O'Hare flow transfer is treated at the Northside WRP which discharges sanitary effluent that is tributary to the CSSC.

- The entire Lake Michigan water supply component of the O'Hare flow transfer is from communities contained in the above list.

The Lake Michigan water supply for these communities is measured, while the sanitary portion of the CSO's is derived through simulation. Column 9 represents an addition to the Romeoville record and the total WY96 addition is 249.9 cfs. This flow is a decrease of 5.3 cfs from WY95 to WY96.

Column 10: Total Diversion

Column 10 is equivalent to Column 3 with the subtraction of Column 8 and the addition of Column 9. The total diversion for WY96 is 3,108 cfs. This amount is 92 cfs less than Illinois' long term diversion allocation of 3,200 cfs. The 40-year running average diversion, rounded to the nearest cfs, beginning with WY81, is 3,418 cfs and the cumulative deviation from the 3,200 cfs allocation is -3,493 cfs. The negative deviation indicates that the cumulative diversion is greater than an average of 3,200 cfs for the period.

Column 11 Through Column 13: Lake Michigan Diversion Components

Columns 11 through 13 represent the three (3) Lake Michigan diversion components:

- Column 11 - Lake Michigan pumpage accountable to Illinois (1,782.0 cfs)
- Column 12 - Runoff from the diverted Lake Michigan watershed (882.0 cfs)
- Column 13 - Direct diversion through the lakefront structures (378.8 cfs)

Prior to WY93, a double accounting of runoff from the Calumet ungaged watershed existed. The flow that was double accounted was the infiltration into the separate sanitary sewers within the Calumet ungaged watershed. For a detailed description of this double accounting refer to the Lake Michigan Diversion Accounting Water Year 1990 report contained in the Water Year 1993 Annual Report. This area is discussed in the section on ungaged watershed modeling under the main section on areas for improvement. The correction in WY93 for this double accounting was based solely on area proportioning from sewer maps. Unfortunately, separately sewered SCAs in SCALP do not contain actual areas. Therefore, the approximations that were made for tributary areas for the separate sewers could not be cross-checked against the SCALP models for accuracy. The infiltration into the separate sewers within the ungaged Calumet watershed was ultimately subtracted from the computation of runoff from the Lake Michigan watershed.

The sum of the columns (3,042.8 cfs) should theoretically equal the total diversion as shown in Column 10 (3,107.5 cfs), with one exception. The Romeoville record measures sewer effluent instead of water supply pumpage, while Column 11 (Lake Michigan water supply pumpage accountable to Illinois) does not account for consumptive use. This difference is consumptive loss, the water supply pumpage that is consumed or lost prior to reaching the water reclamation facilities. This consumptive loss is estimated as 10% of the water supply pumpage (International Great Lake Diversion Consumptive Use Study Board, 1981).

Because the diversion estimate from Columns 11 - 13 is based on simulation, suspect ratings of the lakefront structures (which underestimate leakage), and simple flow separation techniques, the estimate is not expected to be as accurate as the AVM based calculations. Consequently, a difference between estimates of 64.7 cfs or 2.1% is an excellent balance. However, this balance is largely due to the consumptive losses included in Column 11 being offset by underestimated flows in Column 13. The discrepancy between Column 10 and the sum of Columns 11, 12, and 13 is related to the canal system balance in Budget 14. This budget is discussed in a subsequent section, and potential sources of the discrepancy are addressed in that discussion.

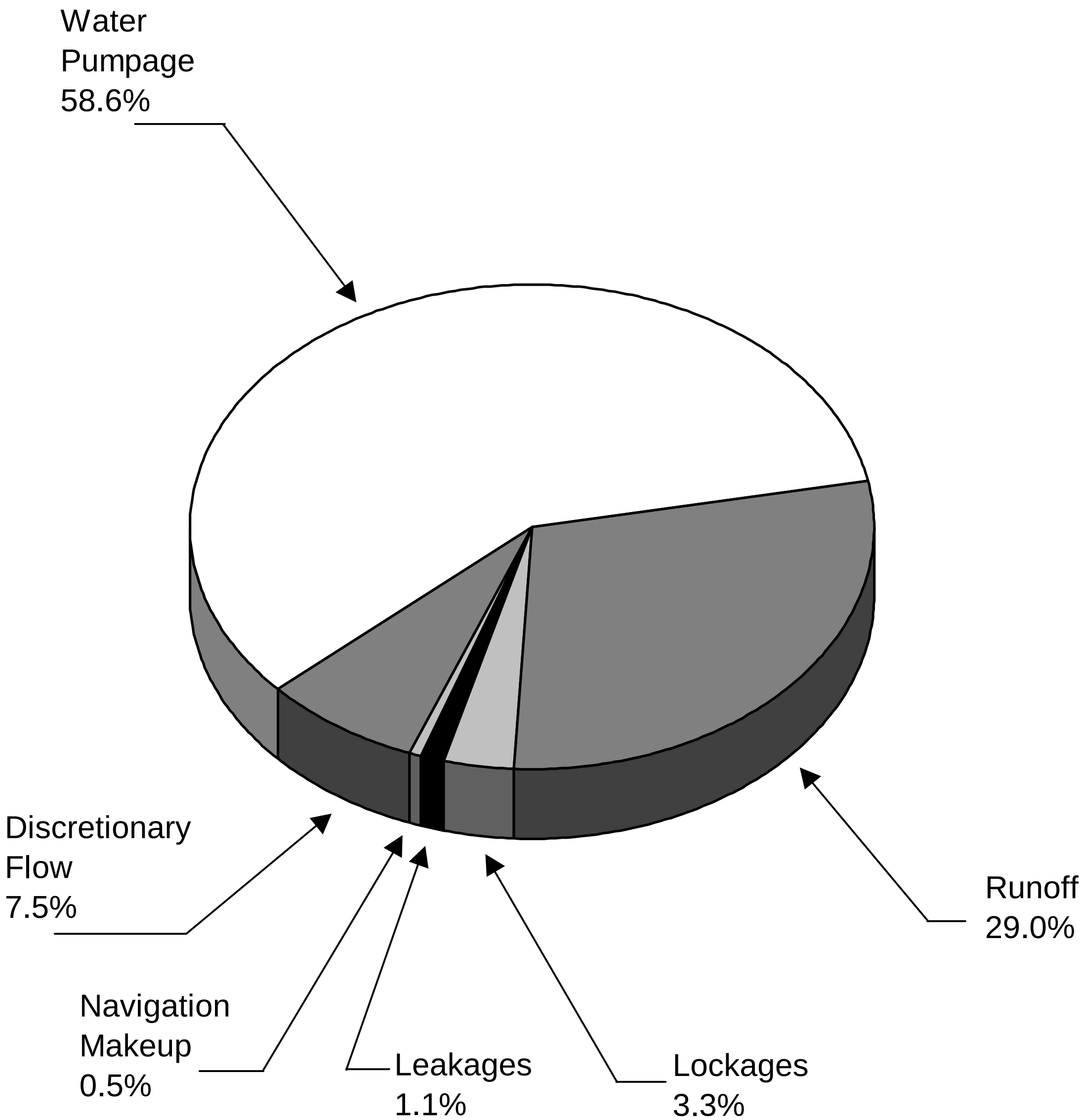
Using the figures from these three (3) columns, 58.6% of the WY96 Illinois diversion is attributable to pumpage from Lake Michigan for domestic water supply, runoff from the diverted Lake Michigan Watershed accounted for 29.0% of the diversion, and direct diversion through the lakefront structures accounted for 12.4% of the diversion. Water supply from Lake Michigan decreased 45.8 cfs from WY95 to WY96. Due to increased rainfall between WY95 and WY96, the runoff from the Lake Michigan watershed increased 84.4 cfs between WY95 and WY96. Direct diversions decreased 101.3 cfs between WY95 and WY96. A more detailed breakdown of these percentages is shown in Table 5 and Figure 3.

Table 5

Components of the Diversion by the State of Illinois
Based on Columns 11 Through 13

Description	Average Flow (cfs)	Percentage of Total Flow
Lake Michigan Pumpage by the State of Illinois	1,782.0	58.6%
Runoff from Diverted Lake Michigan Watershed	882.0	29.0%
Total Direct Diversions	378.8	12.4%
Breakdown of Direct Diversions		
Lockages	100.3	3.3%
Leakages	34.8	1.1%
Navigation Makeup Flow	16.1	0.5%
Discretionary Flow	227.5	7.5%
- Total Backflow for WY96 was -6.43 cfs (not included in the values above)		

Figure 3 Component Breakdown of Illinois' Diversion Based Upon Columns 11 Through 13



Budgets

The first two (2) budgets are used to sum the diverted water supply. The next four (4) budgets are of stream gage sites that are not simulated and are used as part of the calculation of the runoff from the diverted Lake Michigan watershed. The next seven (7) budgets compare measured and simulated flows and compute Column inputs used in the diversion computations. The final budget is a canal balance of total inflows and outflows. These fourteen budgets are listed in Table 2.

Budget 1 and Budget 2: Water Supply Pumpage

Budgets 1 and 2 are summations of critical water supply pumpage data. Budget 1 sums Lake Michigan water supply diverted by the State of Illinois. The Lake Michigan water supply data is supplied by the state as daily values for primary users and monthly data for secondary users. Budget 2 sums groundwater pumpages in the Lake Michigan and Des Plaines River watersheds that are diverted to the CSSC. Groundwater pumpage data is recorded by the ISWS as a total annual withdrawal based on calendar years.

Budget 1: Diverted Lake Michigan Water Supply

Budget 1 represents the summation of Lake Michigan pumpage accountable to the State of Illinois. This budget is a duplication of Column 11. For WY96, the average annual Lake Michigan pumpage accountable to Illinois is 1,782.0 cfs. This flow is a decrease of 45.8 cfs from WY95.

Budget 2: Groundwater Diverted to the CSSC

Budget 2 is groundwater water supply pumpage by communities, industrial users, and other private users whose effluent is discharged to the canal. The contents of this budget are also contained in Column 4. The groundwater pumpage data are reported by the ISWS on a calendar year basis. The groundwater quantity is determined by summing all reported groundwater sources in the area tributary to the CSSC, less groundwater not discharged to the CSSC in the form of CSO's.

Using the ISWS groundwater records, groundwater pumpages were assumed to reach the CSSC and adjoining channels if they were located in the diverted Lake Michigan watershed in Illinois, or if they were located within MWRDGC service boundaries in which their effluent was discharged into the CSSC and adjoining channels.

The total groundwater pumpage by communities, industrial users, and other private users whose sanitary effluent is tributary to the canal is 37.2 cfs for WY96. Simulation determined that all of this flow reached the canal. In most years a small portion of the groundwater normally tributary to the CSSC is discharged to the Des

Plaines River or other watercourses not tributary to the canal in the form of CSO's. The total groundwater pumpage reaching the canal represents an increase of 2.5 cfs from WY95 to WY96.

In addition to groundwater supply pumpage, there was also a significant amount of groundwater infiltration into the two TARP systems that ultimately reached the canal. Mainstream TARP and Calumet TARP accounted for 49.5 cfs and 9.5 cfs, respectively, of groundwater discharged to the canal during WY96.

Budgets 3 Through Budget 6: Stream Gaging Stations

The stream gage budgets are used to make estimates of runoff from portions of the diverted Lake Michigan watershed. Sanitary and other point source flows are subtracted from the stream gaging record to develop the runoff estimates. The runoff estimates are used in Column 12. The flows at the stream gaging sites are also part of Budget 14, the canal system budget.

Table 6 presents the estimated runoff from these budgets. Note that Budgets 4 and 5 contribute flows to Budget 6 in that they are upstream of, or tributary to, the Little Calumet River at South Holland. Also note that the Little Calumet River is a losing stream (i.e. it recharges groundwater). The computations in deriving runoff account for this when recharge is significant (i.e., when groundwater recharge is computed). The streamflow in Budget 6 is the total flow at the gage, while the runoff is an incremental volume that occurs downstream of both the Little Calumet River at the State Line and Thorn Creek at Thornton.

Table 6

Stream Gage Flow Separation

Budget Number	Location	Stream Flow (cfs)	Sanitary Flow (cfs)	Runoff (cfs)
3	North Branch Chicago River at Niles, IL	128.7	19.0	109.7
4	Little Calumet River at IL-IN State Line	86.3	5.9	80.4
5	Thorn Creek at Thornton, IL	123.3	18.9	104.4
6	Little Calumet River at South Holland, IL	209.8		12.5

Budgets 7 Through Budget 13: MWRDGC Water Reclamation Facilities

The budgets for the water reclamation plants compare the simulated flows to the measured inflows at the MWRDGC facilities and perform verifications of the diversion accounting program. The simulated flows were developed from an estimated sanitary flow with a daily, weekly, and monthly flow variation, from hydrologic precipitation-based runoff models, and from hydraulic sewer routing models. The estimated sanitary flow input to the hydraulic simulation models is based on the population estimates for each plant's service basin. Per capita sanitary flows are determined based on the service basin's water supply minus an assumed 10% consumptive loss (International Great Lakes Diversion Consumptive Use Study Board, 1981). Simulated flows were compared with recorded inflows at each facility to assess the accuracy of the simulations. The discussion of the budgets will concentrate on the results of each individual simulation as the development of these models have been discussed in previous reports.

Budget 7: Northside Water Reclamation Facility

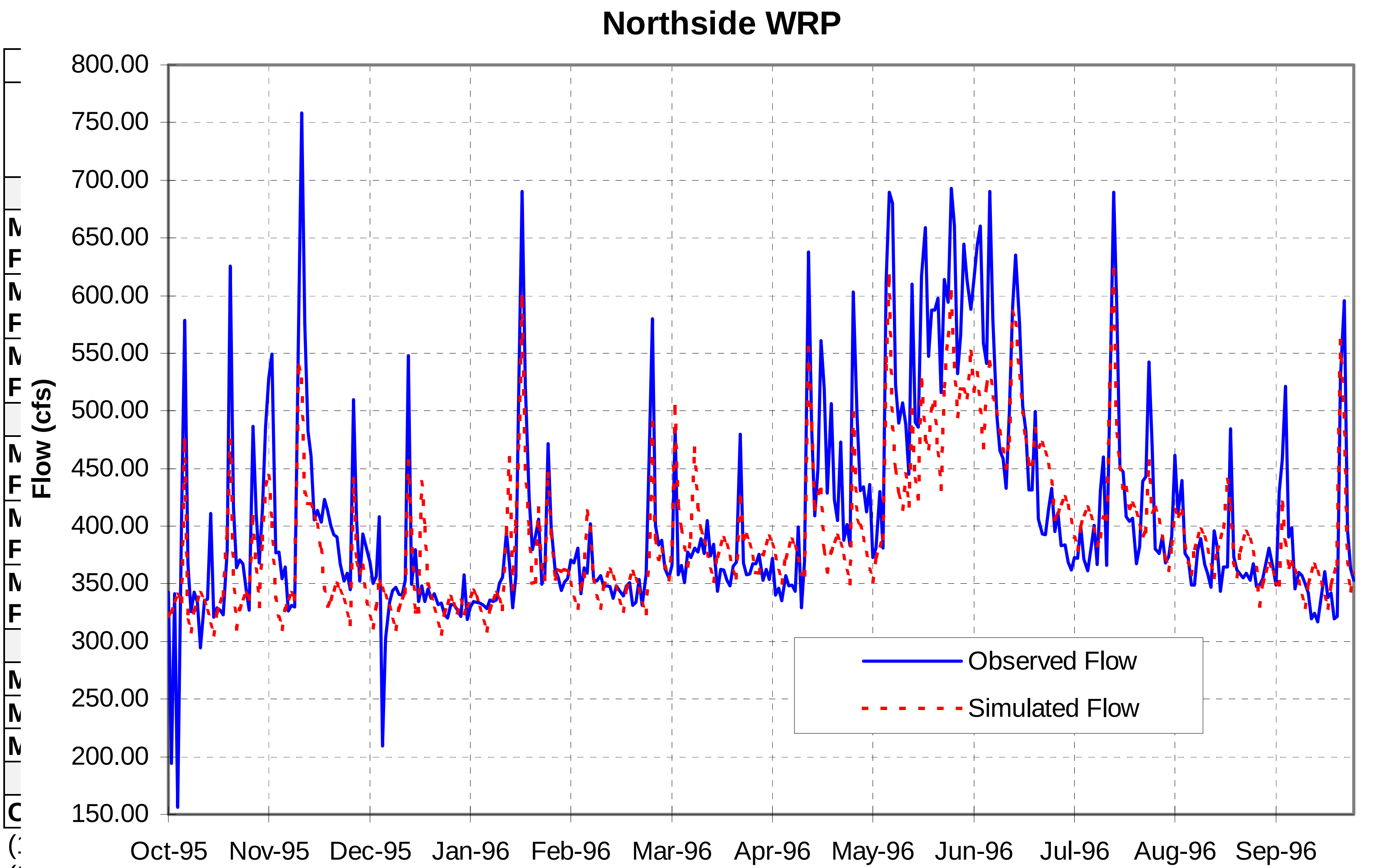
Budget 7 analyzes the water balance at the MWRDGC Northside Water Reclamation Facility (Figure 4). The balance for WY96 of the inflow to the Northside facility is excellent. The simulated to adjusted recorded inflow ratio (S/R) for the Northside WRP is 0.96, indicating that the simulated inflow volume is slightly less than the adjusted observed inflow volume. The coefficient of correlation (R) of simulated to observed flow is 0.86, indicating that the model predicted the inflow hydrograph to the Northside facility well. Refer to table 7 for a statistical summary of the simulation results.

Budget 8: Upper Des Plaines Pump Station

Budget 8 analyzes the water balance at Upper Des Plaines Pump Station (UDPPS) (Figure 5). The pump station budget is used to verify simulated flows. Although it has no direct impact on the diversion calculation, it is intended to be used as a primary calibration point for the models that simulate the deductible runoff from the Des Plaines watershed contained in Column 6. This will be possible only after the existing measurement problems at that site are resolved. This has been previously discussed in the WY90 diversion report. Since the records of the UDPPS were not available from the MWRDGC, a comparison of the simulated with the recorded flows was not possible for WY96.

While the statistical comparisons of simulated and recorded flows at the UDPPS are routinely conducted, there exists a need to investigate alternative flow

Table 7



	em L)
M	
F	8.7
M	
F	6.0
M	
F	2.0
M	
F	0.1
M	
F	3.0
M	
F	4.0
M	.00
M	.37
M	.58
C	.85

(2) Based on weekly values. N/A - Data not available

(3) Does not include days with missing records.

Figure 4 Budget 7 - Simulation of the MWRDGC Northside Water Reclamation Facility

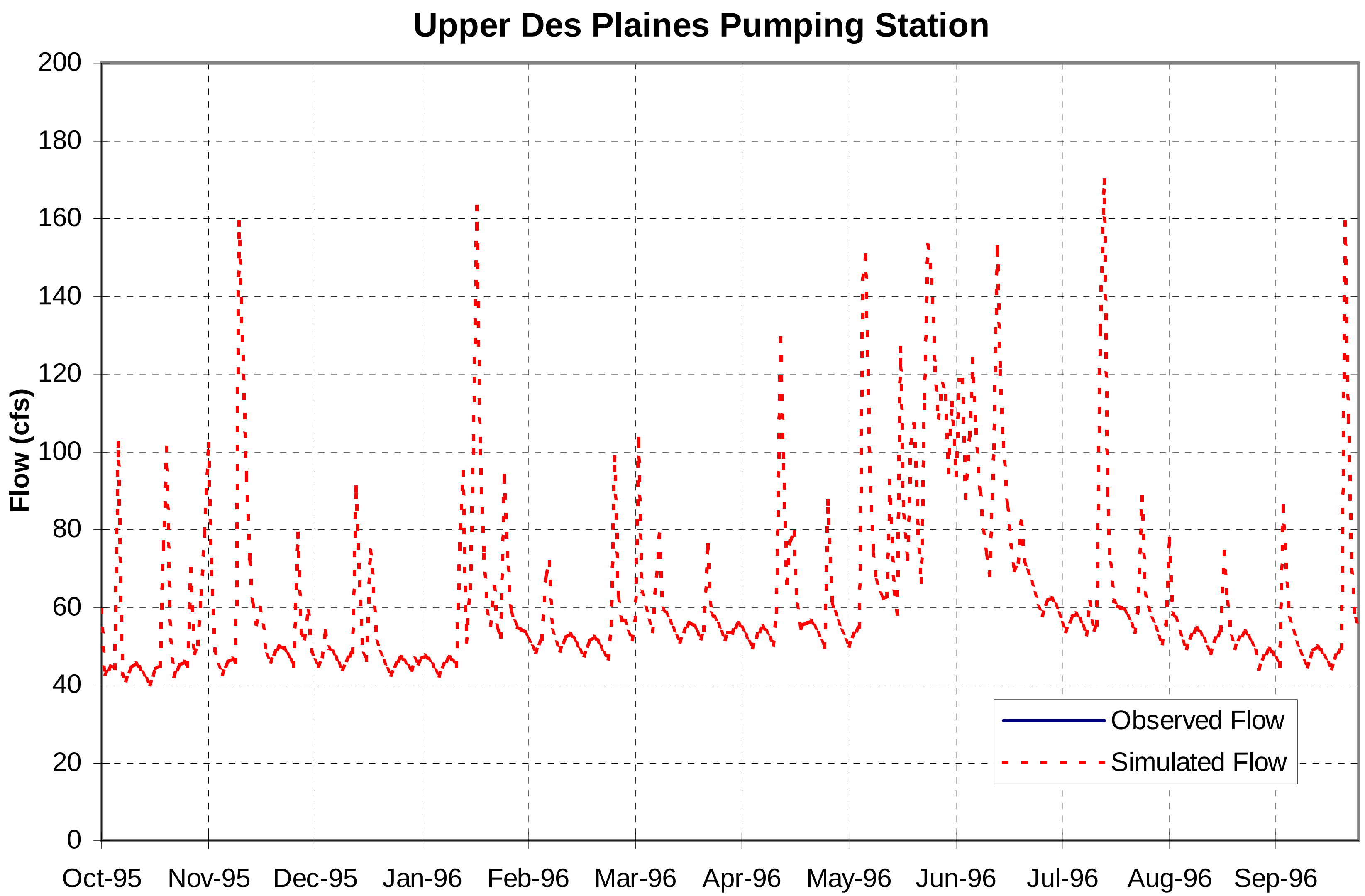


Figure 5 Budget 8 - Simulation of the MWRDGC Upper Des Plaines Pump Station

measurement techniques. This site has continued to experience its share of problems. Normally, a large number of days of records are unavailable due to meter malfunctions, problems with the recording charts which make data transformation impossible, and various other reasons. Since all of the records for WY96 were unavailable, the quantitative analysis of the simulation was not possible. Additionally, the accuracy of the flow meters at the pump station is questionable and unmetered bypass flows are a frequent occurrence. Therefore, total flow may not be measured in storm events and the recycling of flow is possible. Further investigation of the accuracy of flow measurement at the pump station is required to verify and calibrate the simulation models that compute the deductible runoff from the Des Plaines watershed contained in Column 6.

Budget 9: Mainstream and Des Plaines TARP Pumping Stations

Beginning 6 June 1993 the south and middle legs of the Des Plaines TARP system became operational. Consequently, these tunnels were added to the modeling of the TARP system for WY93. The Des Plaines tunnel system, like that of the Mainstream TARP system, flows by gravity to the West Southwest Water Reclamation facility in Stickney. Flows are pumped from the Des Plaines tunnel to the West Southwest plant using pumps independent of those used for the Mainstream tunnels. The Des Plaines system, like the Mainstream system, is modeled with independent index drop shafts which set the opening and closing sequence of various control structures along the tunnel system. The opening and closing sequences are based on water surface elevations at the index drop shafts. Water surface elevation trigger points are set at the downstream pumping station. These points tell the model when to turn the pumps on or off.

Budget 9 analyzes the water budget at the MWRDGC Mainstream and Des Plaines TARP Pumping Stations. The results of Budget 9 are used as a verification point for simulated flows. Budget 9 also is used for the purpose of computing a portion of Column 6 (Des Plaines River watershed runoff deduction). The deductible portion of Budget 9 includes groundwater seepage into the TARP tunnel walls and Des Plaines River watershed runoff captured by Mainstream and Des Plaines TARP as overflows. The modeling of Mainstream and Des Plaines TARP is performed using the Tunnel Network (TNET) dynamic hydraulic model. A simplified map of Mainstream and Des Plaines TARP is contained in Figure 6. A more in-depth description of Mainstream TARP and the simulation model is contained in the Water Year 1986 report, which is an appendix to the Diversion Accounting Annual Report for WY90-92 (USACE, 1994).

In analyzing the balance at the Mainstream and Des Plaines TARP Pumping Stations, weekly flows were used rather than daily flows. While MWRDGC maintains daily pumpage records, days with no pumpage occur frequently. Therefore, it is not appropriate to compute a daily S/R ratio. Additionally,

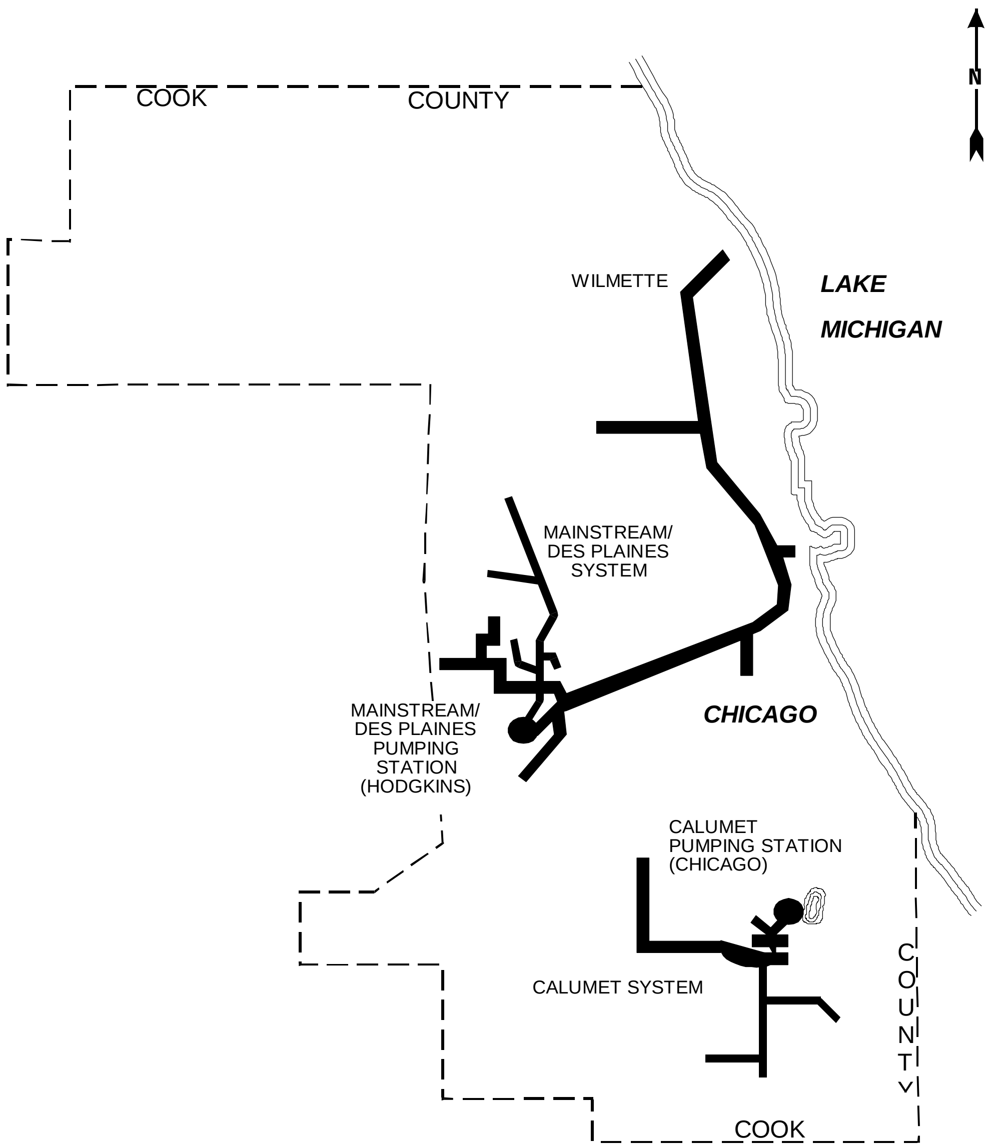


Figure 6 Map of Mainstream, Des Plaines and Calumet TARP

MWRDGC tends to pump from the tunnels at night, while the model simulates pumpage based on water elevations at the downstream end of the tunnel.

The balance for WY96 of the inflow to the Mainstream and Des Plaines TARP Pumping Stations is good. The simulated to recorded flow ratio (S/R) for the Mainstream and Des Plaines TARP Pumping Stations is 1.12, indicating that the simulated inflow volume is greater than the recorded inflow volume. The coefficient of correlation (R) of simulated to recorded flow is 0.73, which is significantly better than the 0.51 correlation in WY95. However, there remains room for improvement in the ability of the model to predict trends in the pump station flows. Table 7 presents a statistical summary of the simulations results.

From a review of the plot of the simulated versus recorded flow at the pump station (Figure 7), it appears that the model responds similarly to the recorded pumpage record. However, the model is sometimes out of phase with the observed record. This could be the result of simulated pumpages occurring sooner and more frequently than actual pumpages. The TNET model simulated pumpage that normally turned on sooner and pumped more frequently in order to maintain computational stability during a simulation.

In summary, it appears that the simulation of the Mainstream and Des Plaines TARP systems is reasonable. However, there is concern regarding the difference in simulated and recorded pumpage time series.

Budget 10: Stickney Water Reclamation Facility

Budget 10 analyzes the water balance at the MWRDGC Stickney Water Reclamation Facility (Figure 8). Simulated Mainstream and Des Plaines TARP pumpages from Budget 9 are no longer combined with simulated interceptor inflow to the Stickney Water Reclamation Facility to derive the total simulated inflow to the Stickney Facility. Instead, only simulated interceptor inflows are compared with recorded interceptor inflows to assess the accuracy of the simulation. The decision to not include TARP pumpages in the treatment plant budgets was based on the fact that the TARP systems are already analyzed in separate budgets. Including TARP pumpages in the treatment plant budgets is detrimental to the statistical results of the treatment plant budgets, since the TARP models generally do not respond as well. When simulations of interceptor flows are treated separately, the response of the hydrologic runoff models (HSPF) and the hydraulic sewer routing models (SCALP) can be better isolated and not diluted by the TARP model results, which are analyzed separately on their own merits and contained in their own budgets (Budgets 9 and 11).

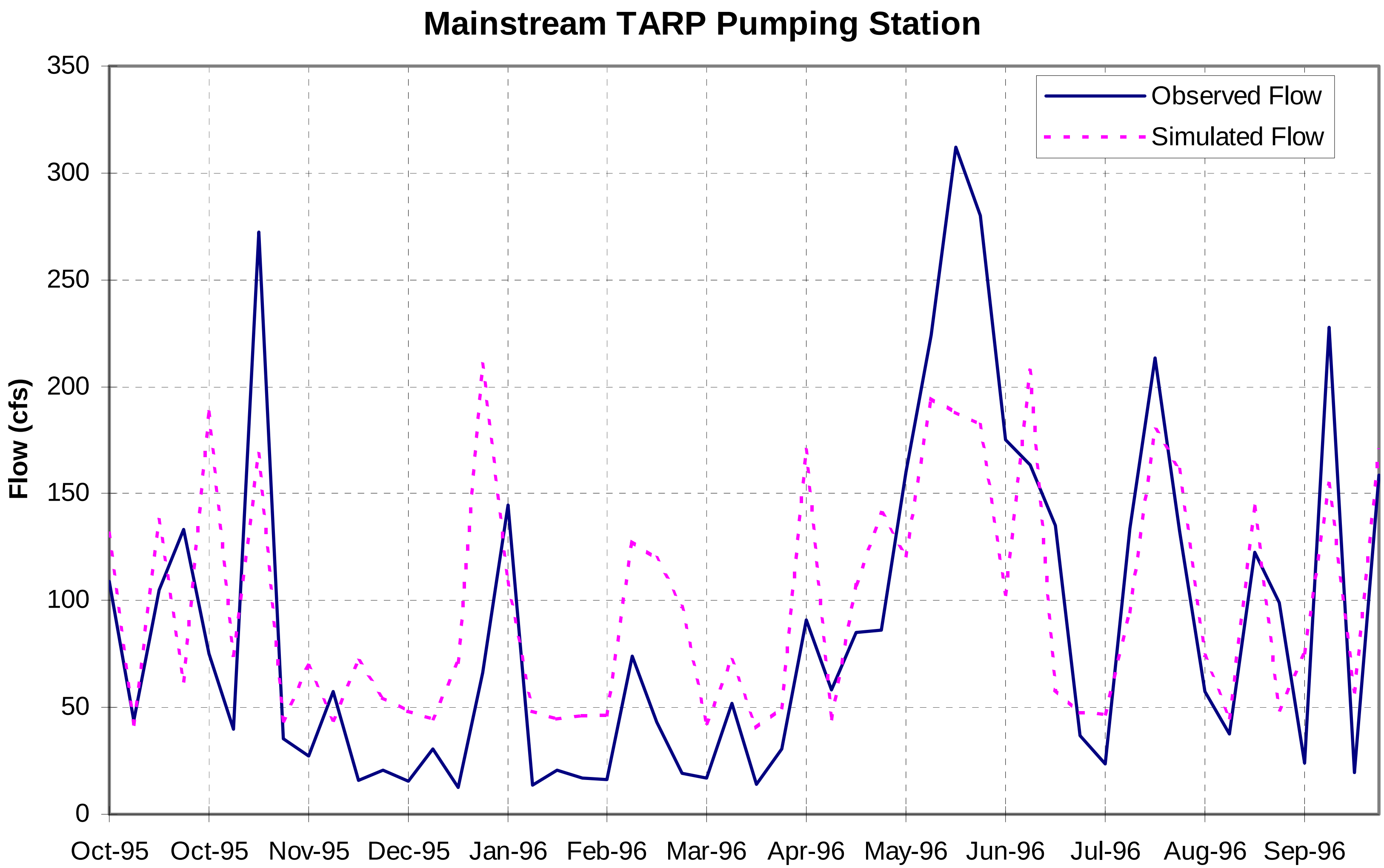


Figure 7 Budget 9 - Simulation of the MWRDGC Mainstream and Des Plaines TARP Pumping Station

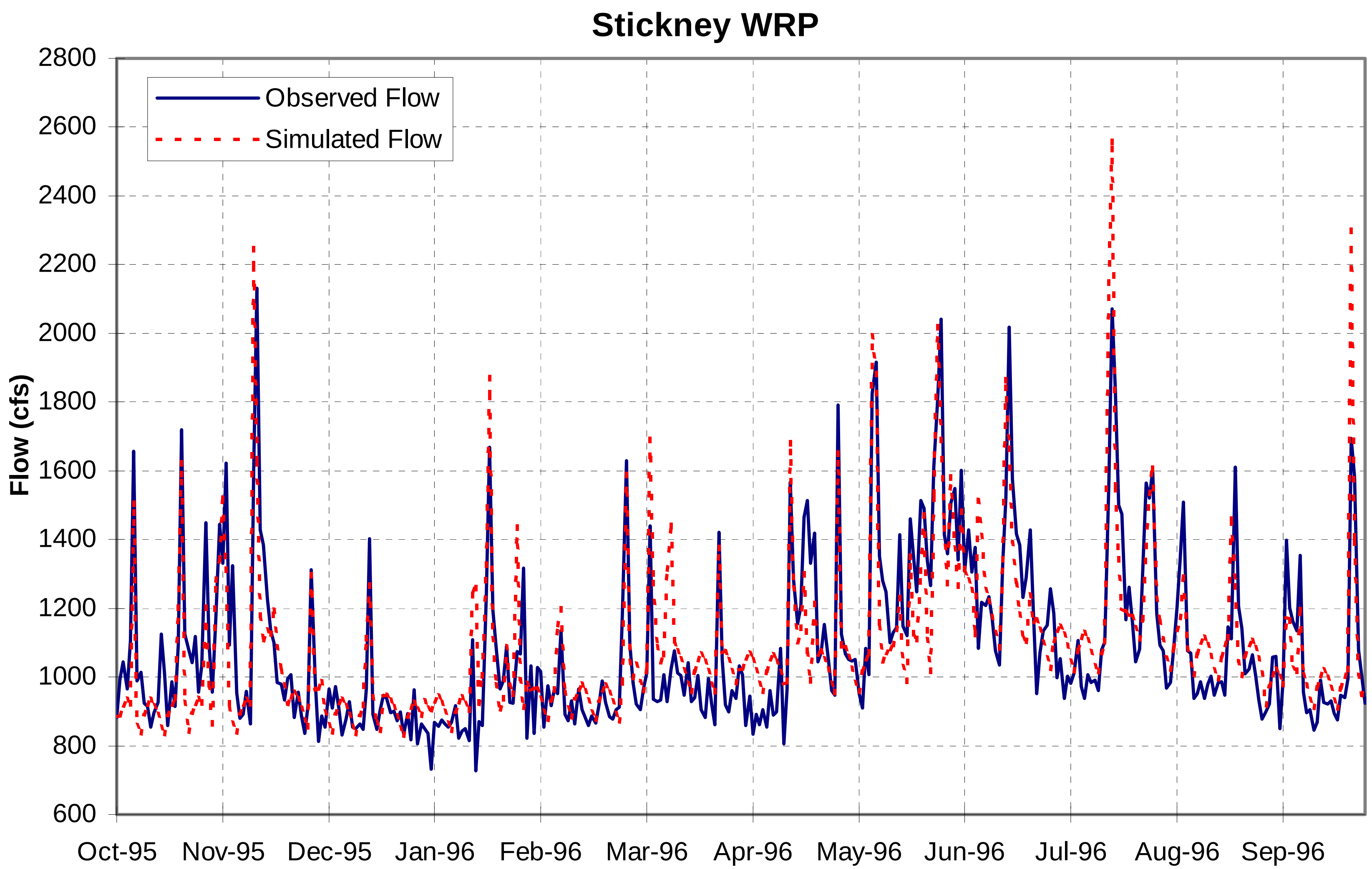


Figure 8 Budget 10 - Simulation of the MWRDGC Stickney Water Reclamation Facility

Overall, the balance for WY96 of the inflow to the Stickney facility is excellent. The simulated to recorded flow ratio (S/R) for the Stickney plant is 1.00, indicating that the simulated interceptor inflow volume is matching the recorded interceptor inflow volume. The coefficient of correlation (R) of simulated to recorded flow is 0.82, indicating that the model performed well in predicting the trends in the interceptor inflow hydrographs to the Stickney facility. Refer to table 7 for a statistical summary of the simulation results.

Budget 11: Calumet TARP Pumping Station

Budget 11 analyzes the water budget at the MWRDGC Calumet TARP Pumping Station (Figure 9). The results of Budget 11 are used as a verification point for simulated flows. The modeling of Calumet TARP is performed using the Tunnel Network (TNET) dynamic hydraulic model. A simplified map of Calumet TARP is contained in Figure 6. A more in-depth description of Calumet TARP and the simulation model is contained in the Water Year 1987 report contained in the Diversion Accounting Annual Report for WY90-92 (USACE, 1994). For WY96 the Calumet TNET model was changed to incorporate additional tunnel segments that went on line. Some modifications to the tunnel geometry (slope, inverts, diameters, lengths, roughness) of existing reaches was also changed to reflect as-built drawings. For WY96, the new tunnel reaches (Indiana Ave, 140th St., Markham) were added and the dropshafts associated with the new tunnel were not activated in the TNET model until April 1, 1996, the approximate date at which they were physically activated by MWRDGC.

In analyzing the balance at the Calumet TARP Pumping Station, weekly flows were used instead of daily flows. While MWRDGC maintain daily pumpage records, days with no pumpage occur frequently. Additionally, MWRDGC tends to pump at night, while the model pumps more frequently based on water elevations at the downstream end of the tunnel. Therefore, it is not appropriate to compute a daily S/R ratio.

The balance for WY96 of the inflow to the Calumet TARP Pumping Station is fair. The simulated to recorded flow ratio (S/R) for the Calumet TARP Pumping Station is 0.65 indicating that the simulated inflow volume is less than the recorded inflow volume. The coefficient of correlation (R) of simulated to recorded flow is 0.42, indicating a need for improvement in the ability of the model to predict trends of the recorded Calumet TARP pumpages. Table 7 contains a statistical summary of the simulation results.

Volume matching between the simulated and recorded Calumet TARP pumpages also was more difficult for WY96 as evidenced by the 0.65 S/R ratio. Because of the instability of the TARP model, as well as uncertainties in the Calumet TARP system, it was difficult to improve on this ratio. However, as the

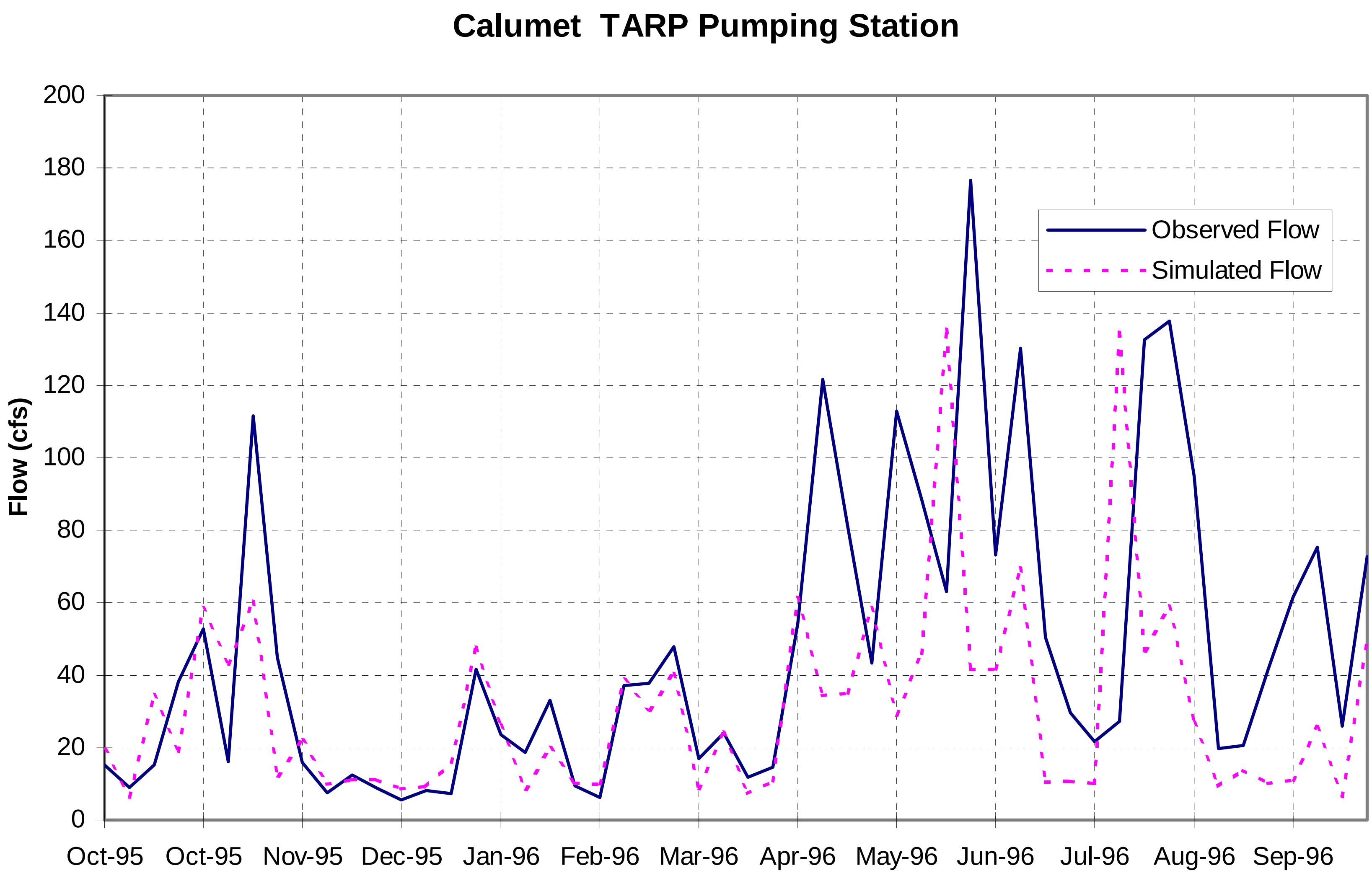


Figure 9 Budget 11 - Simulation of the MWRDGC Calumet TARP Pumping Station

system is presently modeled, this does not impact the computed diversion, since all Des Plaines River watershed areas whose overflows are modeled as tributary to Calumet TARP are also modeled such that "non-captured" overflows flow to rivers that are tributary to the CSSC. Therefore, whether or not these Des Plaines River watershed runoff flows enter the tunnel or not, they are presently included in the Des Plaines River watershed runoff deduction in Column 6. This assumption will remain until separately sewered areas are modeled such that actual areas are used instead of effective areas in the hydraulic models. This has been discussed in the WY90 diversion accounting report.

Budget 12: Calumet Water Reclamation Facility

Budget 12 analyzes the water balance at the MWRDGC Calumet Water Reclamation Facility (Figure 10). Simulated Calumet TARP pumpages from Budget 11 are no longer combined with simulated interceptor inflows to the Calumet Water Reclamation Facility to derive the total simulated inflow to the Calumet Facility. Instead, only simulated interceptor inflows are compared with recorded inflows to assess the accuracy of the simulation. This was revised for the same reasons as outlined previously in the discussion for Budget 10.

The annual simulated to recorded flow ratio (S/R) and the coefficient of correlation for the Calumet Water Reclamation Facility are considered excellent. The S/R ratio is 1.02 indicating that the simulated Calumet interceptor flow volume was slightly more than the recorded interceptor flow volume. The coefficient of correlation was 0.91 indicating a very good correlation between simulated and recorded interceptor flows. Refer to table 7 for a statistical summary of the simulation results.

Budget 13: Lemont Water Reclamation Facility

Budget 13 analyzes the water balance at the MWRDGC Lemont Water Reclamation Facility (Figure 11). Overall, the balance for WY96 of the inflow to the Lemont facility is good. The simulated to recorded flow ratio (S/R) for the Lemont is 0.69, indicating that the simulated inflow volume was less than the recorded inflow volume. The coefficient of correlation (R) of simulated to recorded flow is 0.82, indicating that the model predicted the inflow hydrograph to the Lemont facility reasonably well. Table 7 contains a statistical summary of the simulation results.

Aggregated Results of Four MWRDGC Water Reclamation Facilities

The aggregated simulated inflows (not including TARP) to the four modeled MWRDGC water reclamation facilities are 1860.9 cfs while the measured inflows are 1867.8 cfs. This results in an excellent aggregated S/R ratio of 0.996.

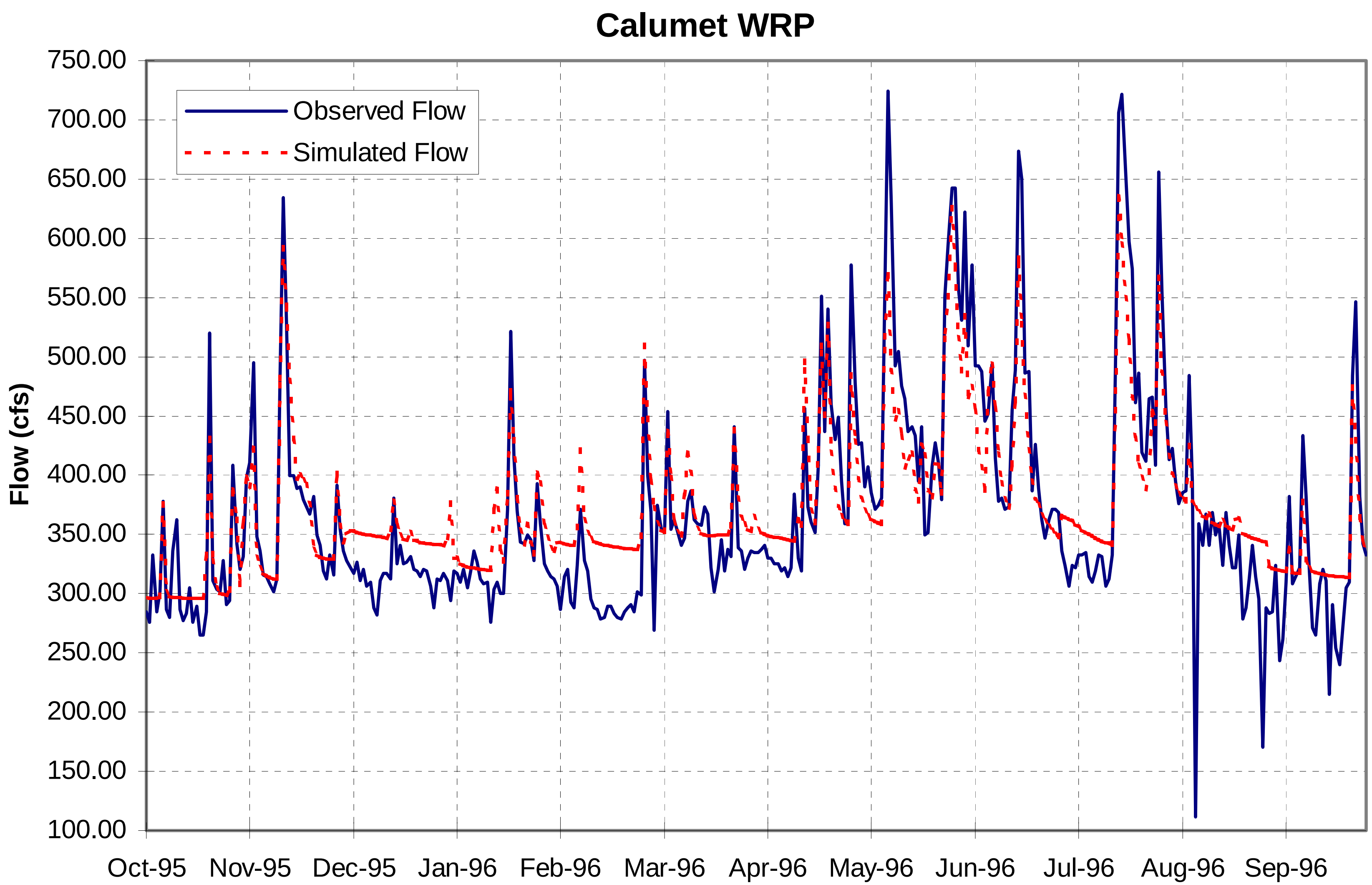


Figure 10 Budget 12 – Simulation of the MWRDGC Calumet Water Reclamation Facility

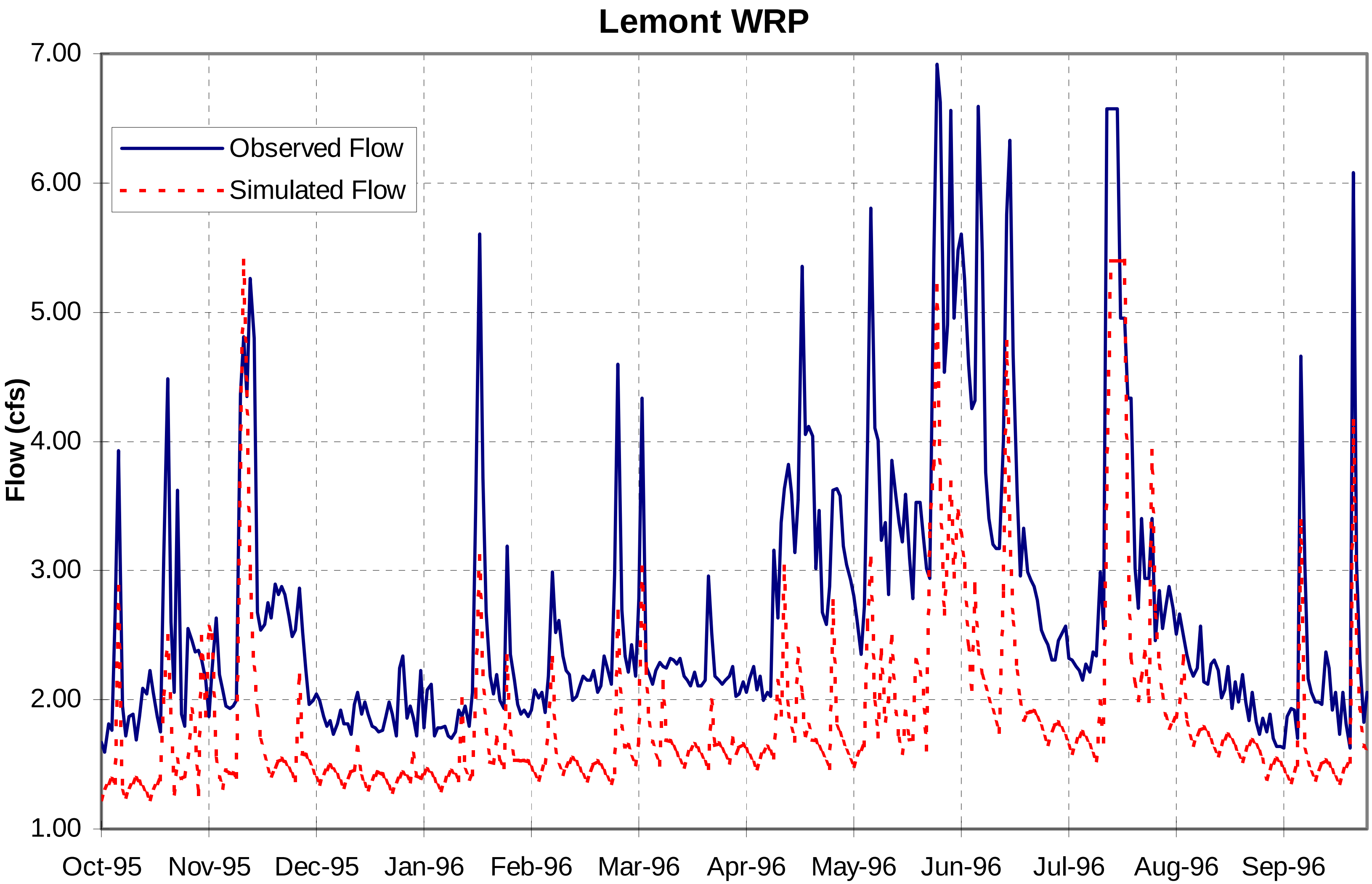


Figure 11 Budget 13 – Simulation of the MWRDGC Lemont Water Reclamation Facility

Budget 14: CSSC System Balance

Budget 14 compares the inflows and outflows to the CSSC system (Figure 12). The inflow components include direct diversions through the lakefront structures, stormwater runoff discharged to the canal system, and domestic water supply whose effluent discharges to the canal system. The outflows from the canal system include the discharge past the Romeoville AVM, backflows through the lakefront structures and withdrawals upstream of Romeoville by Argonne National labs and Citgo Petroleum Corporation. The individual components are presented in Table 8 for WY96.

Overall, the balance for WY96 between the inflows to the canal system and the outflows from the canal system is excellent. The S/R (inflow/outflow) for the canal system is 1.00, indicating that the inflow to the canal system matches the outflow from the canal system. The average measured/simulated inflow was 3,180.1 cfs while the average measured/simulated outflow was 3,178.7 cfs. The difference is 1.4 cfs (less than 0.1%) for WY96, as compared to 4.5 cfs (0.1%) for the previous water year, WY95. Refer to table 7 for a statistical summary of the measured/simulated results.

The coefficient of correlation (R) of inflow to outflow is 0.85, indicating that the time series trends of inflow to outflow are well correlated. The coefficient of correlation is based on daily flows. Timing between inflows and measured outflows at Romeoville is the major factor in the differences, especially during changes in flow that occur at the beginning or end of a day. Also, part of the difference in the correlation is the result of travel time from inflow locations downstream to the Romeoville AVM site. Therefore, variability in the coefficient of correlation from year to year may be attributed to the variability in the timing of significant flow changes during a particular year.

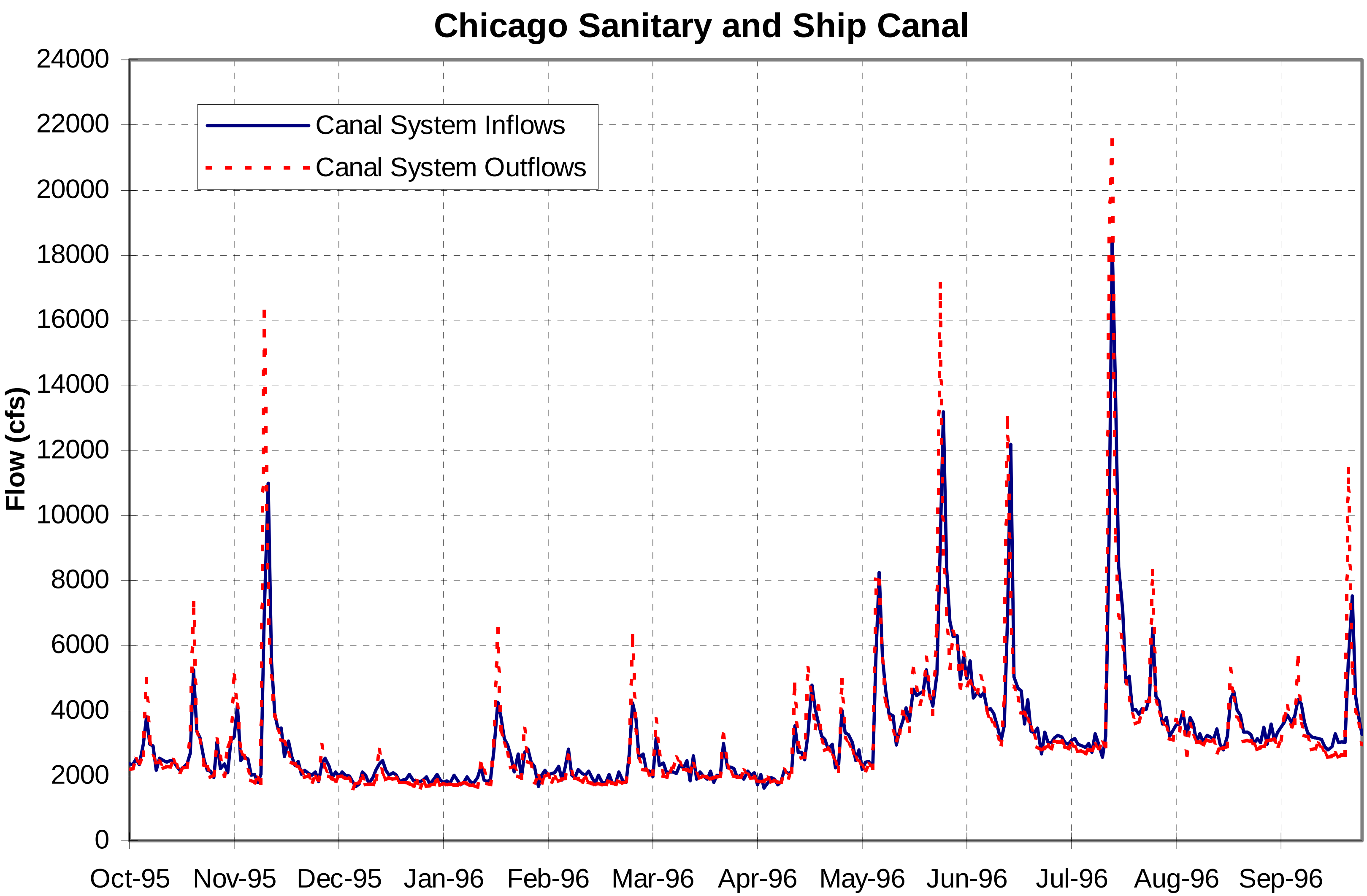


Figure 12 Budget 14 – CSSC System Balance

Table 8 – WY1996 Summary of Flow Components for the CSSC System Balance

INFLOWS (cfs)	
Lake Controlling Structures (measured)	
- Wilmette Controlling Works	29.1
- Chicago River Controlling Works	149.6
- O'Brien Lock and Dam	200.1
Streamflows (measured)	
- North Branch Chicago River at Niles	128.7
- Little Calumet River at South Holland	209.8
- Grand Calumet River at Hohman Ave.	36.3
MWRDGC Water Reclamation Facilities (measured)	
- Northside	409.5
- Stickney	1,178.6
- Calumet	414.3
- Calumet TARP Pumpage to River	0.0
- Lemont	2.7
Other Point Sources (measured)	6.4
Summit Conduit (simulated)	12.3
Combined Sewer Overflows (simulated)	219.9
Direct Runoff to CSSC (simulated)	182.9
TOTAL INFLOWS (cfs)	3,180.1

OUTFLOWS (cfs)	
Cal-Sag Flow Transferred to Calumet WRP as Steel Mill Blow-down	2.5
Lake Front Backflows	6.4
Argonne Laboratory	0.6
Citgo Petroleum Corporation	6.8
USGS AVM Record	3,162.4
TOTAL OUTFLOWS (cfs)	3,178.7

DIFFERENCE (cfs)	1.4

Areas for Improvement

Impervious Model Estimates

During a review of the detailed Lake Michigan watershed runoff study conducted by the Corps of Engineers during the Lake Michigan Diversion Accounting mediations, it was determined that the hydraulic connectivity of the impervious areas used in the rainfall-runoff modeling was not fully accounted for when the models were revised for the WY90 accounting. As a result, the models appear to overestimate runoff. However, the treatment plant balances remained very good after the model revisions. The most significant effect is in the simulated overflows, which greatly increased after WY90. A detailed study should be conducted of the pervious and impervious percentages applied to the various land use types used for the model and, if necessary, the hydraulically connected impervious areas within the SCALP models should be adjusted for each SCA.

Tunnel and Reservoir Plan Models

The primary purpose of the TARP models is to accurately estimate deductible components of the diversion such as the Des Plaines River watershed runoff and groundwater infiltration through tunnel walls. Low flows, or dry weather flows, must be modeled accurately so that groundwater infiltration into the two TARP systems is properly modeled. These flows constitute a substantial deduction to the diversion and are included in the deductible groundwater flows of Column 4. Therefore, the estimates of simulated groundwater infiltration rates need to be updated periodically to better match the simulated to the recorded dry-weather flows. Procedures for updating simulated dry-weather flows are similar to those used for improving the simulated groundwater infiltration rates for WY89 Calumet TARP as discussed in the WY89 Accounting Report in the Lake Michigan Diversion Accounting Annual Report for WY90-92.

In the Calumet system, some sanitary sewers are connected to TARP. These sewers must be accurately accounted for in the modeling of groundwater infiltration since they contribute to the baseflow, or dry weather, flow into TARP. Currently, some uncertainty remains as to the connection of the separately sewered areas. For accurate modeling of the Calumet TARP system, these connections need to be verified and adjusted if necessary.

Due to model instability, simulated gate closing and pump operation parameters have been simplified or modified. Improvements for model stability are required before the models can better represent the operating procedures. Even after this change, representation of “actual” operating procedures may be difficult due to deviations from the TARP system operation plan, i.e. pumping at night, down times for various pumps, changes in pump ratings, implementation of forecasting algorithms, etc. If possible, the TARP models should be revised to better represent actual operating conditions. First, the modeling should more accurately simulate MWRDGC operational procedures that include less frequent pumping and pumping during the night. Second, the incorporation of a pseudo-forecasting algorithm would allow the model to simulate MWRDGC dewatering procedures prior to a storm. Third, dynamic constituent (inflow-infiltration versus sanitary versus groundwater) tracking can be incorporated to allow more accurate determination of the deductible components of TARP flow. Currently, constant constituent proportions, based on annual volumes, are applied to all simulated pumpages from the TARP tunnels. Therefore, constituent flow percentages from TARP remain unchanged during an entire water year. Fourth, the inclusion of an algorithm to operate index dropshafts based on average water surface elevation in a tunnel reach would provide better simulation of “actual” operations. Sudden, localized changes in water surface elevations would not result in frequent opening and closing of control structure gates that regulate the flows into the drop shafts.

MWRDGC Upper Des Plaines Pump Station

A review of the Upper Des Plaines pump station and its flow record indicates that the flow at the pump station is suspect and subject to operator error. Better flow measurements are needed at the pump station. With better flow measurements, this site will become the most important point for calibrating and verifying the simulation models for the Des Plaines watershed. In the diversion calculation, the primary purpose of modeling is to calculate the deduction for runoff from the Des Plaines watershed that enters the CSSC. The Upper Des Plaines Pump Station is the only point at which a model of the inflow-infiltration can be calibrated and extrapolated to the remaining portions of the Des Plaines River watershed. Because of the many problems associated with the current measurements of flow at this site, the benefits as the primary model calibration point have yet to be realized. Refer to the discussion of Budget 8 for additional details of some of the problems with the current measurements. Installation of better flow measurement equipment at the pump station would facilitate better model calibration.

Assessment of Impact of Using Direct Solar Radiation Versus Cloud Cover

As mentioned earlier in this report, the computation of potential evapotranspiration (PET) has been changed in WY96. Prior to WY96 the cloud cover at O’Hare Airport was used in the computation of solar radiation which is then used in the computation of PET. For WY96 a direct measurement of solar radiation from Argonne National Labs was used because the reporting of cloud cover at

O'Hare Airport had changed. An assessment of the impact of using direct solar radiation versus cloud cover may be warranted in the future.

O'Hare and Egan Basin Flow Transfer

A portion of the flows originating in the O'Hare and Egan Water Reclamation Plants' (WRP) service basins is transferred east to the Northside WRP. The extent of this transfer of flow is not known and the diverted flow is not currently measured. An estimate of the annual flow transfer is provided by MWRDGC. The total O'Hare-Egan flow transfer has been estimated by the MWRDGC as 31 cfs for the past several years.

This transfer is significant to diversion since the O'Hare and Egan facilities discharge outside of the CSSC while the Northside WRP discharges flows that reach the CSSC. Therefore, this transfer contains two components that are deductions to the flow measured in the CSSC. The two deductible components are groundwater pumpage contained in the sanitary portion of the transfer (Column 4), and diverted Des Plaines River watershed runoff (Column 6).

To determine the two deductible components requires an estimate of the sanitary and runoff portions of the flow transfer. Presently the sanitary and runoff portions of the flow transfer are estimated using the same constituent (sanitary, inflow, and infiltration) proportions simulated for the Upper Des Plaines Pump Station by SCALP. Additionally, estimates must be made of the groundwater and Lake Michigan water components of the sanitary portion of the transfer. For WY96, the estimated water supply from the O'Hare and Egan service basins was composed of 2.2% groundwater (0.5 cfs) and 97.8% Lake Michigan water (21.7 cfs). The diverted Des Plaines River watershed runoff was estimated at 8.7 cfs.

For future accounting, simply measuring the basin transfer will not provide any information on the component makeup of the transfer. Thus, a review of the complex hydraulics and hydrology is necessary to determine the best procedure for estimating these flows. Several alternatives, including flow measurement and modeling are under consideration. A more detailed discussion of the flow transfer can be found in the Lake Michigan Diversion Accounting WY86 Report in the Lake Michigan Diversion Accounting WY90-92 Annual Report.

Summary

In compliance with the 1967 U.S. Supreme Court decree as modified in 1980, the WY96 diversion was computed using the best current engineering practice and scientific knowledge.

Overall, the simulations that comprise a significant portion of the diversion accounting computations worked well. The two most significant budgets to the diversion accounting computations, Budget 7, Northside Water Reclamation Facility, and Budget 10, Stickney Water Reclamation Facility, performed very well. Together, Budgets 7 and 10 compute the majority of the deductible Des Plaines River watershed runoff. These budgets have simulated to recorded ratios of 0.96 and 1.00 and correlations of 0.86 and 0.82, respectively. Given the complexity of the hydrologic cycle in the heavily urbanized Chicago metropolitan area, and given the number of human and other factors that cannot be adequately represented in numerical modeling procedures, the results of these two (2) budgets are very good. Additionally, results for Budget 12, the Calumet WRP, were very good. This budget also models a portion of the deductible Des Plaines River watershed runoff. The S/R ratio was 1.02 while the coefficient of correlation was 0.91.

The WY96 diversion accountable to the State of Illinois is 3,108 cfs. This flow is 92 cfs less than the 3,200 cfs average specified by the Decree. The 40 year running average beginning with WY81 and rounded to the nearest cfs is 3,418 cfs, and the cumulative deviation from the 3,200 cfs average is -3,493 cfs-years. The negative cumulative deviation indicates a water allocation deficit and the maximum deficit allowed by the Decree is 2,000 cfs-years.

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Appendix A - Summary of Daily Diversion Flows

Computations:

1. Column 3 equals the sum of Columns 1 and 2.
2. Column 8 equals the sum of Columns 4 through 7.
3. Column 10 = Column 3 - Column 8 + Column 9.

Note: The averages presented in the final row are calculated from the daily values contained in Appendix A.

Deductions from the Romeoville Gage Record

Additions to the Romeoville Gage Record

Lake Michigan Diversion Accounting – WY 1996
October 1995 – Summary of Diversion Flows (All in cfs)

LAKE MICHIGAN DIVERSION ACCOUNTING WY 1996	ROMEOVILLE AVM GAGE RECORD	DIVERSIONS ABOVE THE GAGE	TOTAL FLOW THROUGH THE CANAL	GROUNDWATER PUMPAGE DISCHARGED INTO THE CANAL	WATER SUPPLY PUMPAGE FROM INDIANA REACHING THE CANAL	RUNOFF FROM THE DES PLAINES RIVER WATERSHED REACHING THE CANAL	LAKE MICHIGAN PUMPAGE BY FEDERAL FACILITIES DISCHARGED TO THE CANAL	TOTAL DEDUCTION FROM THE ROMEOVILLE GAGE RECORD	LAKE MICHIGAN PUMPAGE NOT DISCHARGED TO THE CANAL	**TOTAL DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS**	PUMPAGE FROM LAKE MICHIGAN ACCOUNTABLE TO THE STATE OF ILLINOIS	RUNOFF FROM THE DIVERTED LAKE MICHIGAN WATERSHED	DIRECT DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS
DATE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
01-Oct-95	2,370.0	1.9	2,371.9	107.1	22.4	64.1	7.0	200.6	243.7	**2,415.0**	1,877.6	89.5	530.0
02-Oct-95	2,335.0	1.9	2,336.9	41.8	21.8	9.7	6.9	80.1	243.9	**2,500.7**	1,911.1	43.6	635.0
03-Oct-95	2,503.0	1.6	2,504.6	49.5	21.2	12.7	7.3	90.7	241.8	**2,655.7**	1,818.0	57.6	624.0
04-Oct-95	2,341.0	0.9	2,341.9	76.9	20.3	20.5	7.6	125.2	242.3	**2,459.0**	1,810.3	66.7	685.0
05-Oct-95	2,962.0	0.5	2,962.5	53.0	21.8	14.8	6.9	96.6	241.5	**3,107.5**	1,774.8	73.6	536.0
06-Oct-95	3,796.0	0.5	3,796.5	313.8	20.2	688.4	6.4	1,028.9	244.1	**3,011.8**	1,724.3	2,498.6	659.0
07-Oct-95	2,956.0	0.6	2,956.6	135.1	20.4	50.2	6.6	212.2	238.3	**2,982.7**	1,691.3	252.6	669.0
08-Oct-95	2,917.0	1.3	2,918.3	55.0	20.1	17.2	6.4	98.7	238.2	**3,057.8**	1,688.5	99.5	613.0
09-Oct-95	2,169.0	1.1	2,170.1	85.0	20.5	26.4	6.4	138.4	241.9	**2,273.7**	1,759.0	87.7	664.0
10-Oct-95	2,544.0	2.2	2,546.2	53.0	21.1	15.1	6.6	95.7	245.3	**2,695.8**	1,798.4	57.2	686.0
11-Oct-95	2,454.0	2.8	2,456.8	41.7	20.0	11.0	6.7	79.3	244.1	**2,621.5**	1,816.5	37.8	634.0
12-Oct-95	2,412.0	3.1	2,415.1	99.7	22.2	29.2	7.1	158.2	243.3	**2,500.3**	1,833.4	67.1	578.0
13-Oct-95	2,466.0	3.0	2,469.0	41.8	20.2	9.9	6.8	78.8	240.8	**2,631.0**	1,826.5	32.5	611.0
14-Oct-95	2,462.0	2.8	2,464.8	50.3	20.1	13.0	6.3	89.7	240.7	**2,615.8**	1,676.7	59.4	473.0
15-Oct-95	2,275.0	3.6	2,278.6	59.1	20.6	15.0	6.5	101.1	238.9	**2,416.4**	1,652.2	53.2	581.0
16-Oct-95	2,155.0	3.2	2,158.2	69.3	19.9	18.8	7.4	115.4	242.0	**2,284.8**	1,705.7	46.4	548.0
17-Oct-95	2,262.0	4.0	2,266.0	41.7	19.1	9.4	7.8	78.1	242.1	**2,430.1**	1,751.6	27.9	525.0
18-Oct-95	2,351.0	3.2	2,354.2	109.8	21.1	31.3	7.6	169.7	243.0	**2,427.5**	1,762.5	60.1	599.0
19-Oct-95	2,681.0	3.0	2,684.0	48.0	20.0	331.3	8.0	407.3	246.3	**2,523.0**	1,742.8	1,331.0	531.0
20-Oct-95	5,248.0	2.0	5,250.0	307.2	19.2	671.7	7.5	1,005.6	234.9	**4,479.3**	1,677.0	4,908.1	650.0
21-Oct-95	3,353.0	2.3	3,355.3	205.6	19.4	96.6	7.8	329.5	235.2	**3,261.1**	1,642.0	513.6	514.0
22-Oct-95	3,162.0	1.6	3,163.6	50.8	21.4	20.9	7.7	100.8	235.2	**3,298.0**	1,617.0	156.4	513.0
23-Oct-95	2,481.0	2.1	2,483.1	41.8	19.1	15.5	7.4	83.8	237.1	**2,636.4**	1,687.4	105.3	415.0
24-Oct-95	2,156.0	2.1	2,158.1	88.9	19.1	29.2	6.3	143.5	237.5	**2,252.1**	1,667.8	114.7	213.0
25-Oct-95	2,144.0	2.2	2,146.2	41.7	19.7	13.2	6.2	80.7	239.6	**2,305.1**	1,693.2	73.2	99.0
26-Oct-95	1,923.0	2.8	1,925.8	104.4	18.7	36.8	7.4	167.2	238.2	**1,996.8**	1,659.4	195.4	104.0
27-Oct-95	3,022.0	2.8	3,024.8	159.4	19.0	200.6	7.1	386.1	240.4	**2,879.1**	1,639.3	893.3	89.0
28-Oct-95	2,218.0	3.3	2,221.3	45.6	21.2	106.6	6.9	180.4	235.8	**2,276.8**	1,623.8	418.3	102.0
29-Oct-95	2,349.0	2.7	2,351.7	99.6	18.7	46.5	6.9	171.7	238.4	**2,418.5**	1,655.7	193.6	112.0
30-Oct-95	2,074.0	2.4	2,076.4	63.7	19.8	280.1	6.7	370.2	238.5	**1,944.7**	1,651.1	1,001.9	95.0
31-Oct-95	3,093.0	2.1	3,095.1	261.6	24.7	262.6	7.0	555.9	240.1	**2,779.3**	1,632.5	1,020.7	100.0
Averages	2,633.4	2.2	2,635.6	96.8	20.4	102.2	7.0	226.4	240.4	**2,649.6**	1,724.7	472.1	464.1

Lake Michigan Diversion Accounting – WY 1996
November 1995 – Summary of Diversion Flows (All in cfs)

LAKE MICHIGAN DIVERSION ACCOUNTING WY 1996	ROMEOVILLE AVM GAGE RECORD	DIVERSIONS ABOVE THE GAGE	TOTAL FLOW THROUGH THE CANAL	GROUNDWATER PUMPAGE DISCHARGED INTO THE CANAL	WATER SUPPLY PUMPAGE FROM INDIANA REACHING THE CANAL	RUNOFF FROM THE DES PLAINES RIVER WATERSHED REACHING THE CANAL	LAKE MICHIGAN PUMPAGE BY FEDERAL FACILITIES DISCHARGED TO THE CANAL	TOTAL DEDUCTION FROM THE ROMEOVILLE GAGE RECORD	LAKE MICHIGAN PUMPAGE NOT DISCHARGED TO THE CANAL	**TOTAL DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS**	PUMPAGE FROM LAKE MICHIGAN ACCOUNTABLE TO THE STATE OF ILLINOIS	RUNOFF FROM THE DIVERTED LAKE MICHIGAN WATERSHED	DIRECT DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS
DATE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
01-Nov-95	3,183.0	1.5	3,184.5	119.4	18.4	617.4	7.0	762.2	228.9	**2,651.1**	1,653.6	3,223.2	109.0
02-Nov-95	4,148.0	1.1	4,149.1	372.7	19.7	374.5	7.9	774.8	224.7	**3,599.0**	1,634.4	1,676.3	105.0
03-Nov-95	2,465.0	0.3	2,465.3	126.3	17.8	70.2	8.0	222.3	222.5	**2,465.5**	1,644.9	502.1	78.0
04-Nov-95	2,573.0	0.4	2,573.4	41.4	18.6	32.3	8.6	101.0	221.9	**2,694.3**	1,614.2	295.0	68.0
05-Nov-95	2,505.0	1.1	2,506.1	109.3	18.2	48.6	8.5	184.6	223.2	**2,544.7**	1,621.8	254.9	61.0
06-Nov-95	1,997.0	1.5	1,998.5	41.7	18.0	24.2	7.9	91.8	223.4	**2,130.1**	1,655.2	168.7	78.0
07-Nov-95	2,029.0	2.3	2,031.3	52.8	18.3	26.0	7.6	104.6	222.6	**2,149.3**	1,652.7	144.0	74.0
08-Nov-95	1,784.0	3.7	1,787.7	86.3	17.7	36.0	8.0	148.0	223.1	**1,862.9**	1,660.7	145.1	79.0
09-Nov-95	2,036.0	3.5	2,039.5	52.9	19.7	24.4	8.8	105.7	221.4	**2,155.2**	1,627.2	113.5	55.0
10-Nov-95	6,860.0	0.9	6,860.9	76.0	18.0	2,464.3	8.5	2,566.8	241.5	**4,535.6**	1,645.6	15,888.6	55.0
11-Nov-95	10,973.0	0.3	10,973.3	221.7	23.4	849.4	8.0	1,102.5	223.8	**10,094.7**	1,635.5	4,101.8	49.0
12-Nov-95	5,511.0	0.3	5,511.3	315.6	17.3	446.3	8.2	787.3	222.6	**4,946.5**	1,625.2	2,404.3	63.0
13-Nov-95	3,912.0	1.9	3,913.9	280.8	20.7	290.8	8.4	600.6	224.2	**3,537.6**	1,651.3	1,371.5	93.0
14-Nov-95	3,427.0	0.5	3,427.5	58.1	18.5	160.7	8.4	245.6	223.8	**3,405.7**	1,671.5	982.5	94.0
15-Nov-95	3,454.0	0.3	3,454.3	114.2	19.0	138.6	8.4	280.2	219.5	**3,393.6**	1,623.9	804.0	82.0
16-Nov-95	2,570.0	0.4	2,570.4	74.7	17.6	156.9	8.5	257.7	221.2	**2,533.9**	1,653.9	832.7	72.0
17-Nov-95	3,043.0	0.3	3,043.3	127.9	18.9	152.0	8.5	307.1	223.2	**2,959.3**	1,633.1	710.4	76.0
18-Nov-95	2,570.0	0.4	2,570.4	50.3	18.2	106.0	7.7	182.2	223.2	**2,611.4**	1,620.4	579.9	93.0
19-Nov-95	2,315.0	0.3	2,315.3	61.9	18.2	96.8	7.1	183.9	222.6	**2,353.9**	1,617.5	523.6	81.0
20-Nov-95	2,441.0	0.5	2,441.5	92.5	19.7	64.1	7.9	184.1	223.1	**2,480.5**	1,666.3	304.9	67.0
21-Nov-95	2,041.0	0.3	2,041.3	56.4	17.9	48.1	7.4	129.8	222.9	**2,134.4**	1,639.1	245.5	62.0
22-Nov-95	2,161.0	0.4	2,161.4	41.6	18.8	42.2	7.5	110.1	224.9	**2,276.2**	1,691.6	196.9	65.0
23-Nov-95	2,046.0	0.8	2,046.8	64.3	18.3	49.3	7.2	139.1	223.2	**2,130.9**	1,615.5	187.5	76.0
24-Nov-95	2,007.0	0.7	2,007.7	76.2	17.5	52.3	7.4	153.3	221.9	**2,076.3**	1,591.0	169.6	61.0
25-Nov-95	2,113.0	1.0	2,114.0	54.3	18.6	45.5	7.5	125.9	220.4	**2,208.5**	1,591.4	152.6	61.0
26-Nov-95	1,806.0	0.9	1,806.9	91.4	18.1	57.7	7.7	174.9	222.3	**1,854.3**	1,578.0	165.8	64.0
27-Nov-95	2,346.0	1.1	2,347.1	129.4	25.3	218.4	8.0	381.2	225.1	**2,191.0**	1,615.5	1,083.7	68.0
28-Nov-95	2,526.0	1.0	2,527.0	105.5	18.2	89.5	7.9	221.0	221.5	**2,527.5**	1,623.4	347.1	81.0
29-Nov-95	2,272.0	1.5	2,273.5	37.2	17.5	51.9	7.9	114.5	223.1	**2,382.1**	1,648.4	205.4	66.0
30-Nov-95	1,941.0	2.4	1,943.4	101.3	16.8	79.1	8.0	205.3	220.8	**1,959.0**	1,634.5	272.8	70.0
Averages	3,035.2	1.1	3,036.3	107.8	18.8	230.4	7.9	364.9	223.5	**2,894.9**	1,634.6	1,268.5	73.5

Lake Michigan Diversion Accounting – WY 1996
December 1995 – Summary of Diversion Flows (All in cfs)

LAKE MICHIGAN DIVERSION ACCOUNTING WY 1996	ROMEOVILLE AVM GAGE RECORD	DIVERSIONS ABOVE THE GAGE	TOTAL FLOW THROUGH THE CANAL	GROUNDWATER PUMPAGE DISCHARGED INTO THE CANAL	WATER SUPPLY PUMPAGE FROM INDIANA REACHING THE CANAL	RUNOFF FROM THE DES PLAINES RIVER WATERSHED REACHING THE CANAL	LAKE MICHIGAN PUMPAGE BY FEDERAL FACILITIES DISCHARGED TO THE CANAL	TOTAL DEDUCTION FROM THE ROMEOVILLE GAGE RECORD	LAKE MICHIGAN PUMPAGE NOT DISCHARGED TO THE CANAL	**TOTAL DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS**	PUMPAGE FROM LAKE MICHIGAN ACCOUNTABLE TO THE STATE OF ILLINOIS	RUNOFF FROM THE DIVERTED LAKE MICHIGAN WATERSHED	DIRECT DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS
DATE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
01-Dec-95	2,101.0	4.3	2,105.3	44.1	19.7	47.7	8.0	119.6	223.4	**2,209.1**	1,646.1	184.8	70.0
02-Dec-95	1,958.0	1.7	1,959.7	57.7	18.8	50.1	7.6	134.3	226.6	**2,052.0**	1,617.7	187.5	91.0
03-Dec-95	2,105.0	1.7	2,106.7	70.6	17.5	54.2	7.6	150.0	227.0	**2,183.7**	1,594.6	188.8	66.0
04-Dec-95	2,012.0	1.4	2,013.4	73.5	18.0	53.7	7.9	153.1	224.8	**2,085.1**	1,642.6	180.1	65.0
05-Dec-95	1,981.0	1.4	1,982.4	44.2	18.3	50.0	7.6	120.1	226.6	**2,088.9**	1,623.2	172.3	73.0
06-Dec-95	1,805.0	1.1	1,806.1	111.4	17.1	65.0	7.8	201.3	225.7	**1,830.5**	1,632.7	186.4	71.0
07-Dec-95	1,648.0	1.2	1,649.2	37.2	18.3	41.8	7.8	105.0	225.7	**1,769.9**	1,624.9	134.9	66.0
08-Dec-95	1,745.0	1.4	1,746.4	63.8	18.3	48.3	7.8	138.2	223.5	**1,831.7**	1,619.8	142.7	73.0
09-Dec-95	2,098.0	2.5	2,100.5	41.5	18.2	41.2	7.5	108.4	223.4	**2,215.5**	1,578.5	113.1	68.0
10-Dec-95	2,007.0	2.6	2,009.6	74.9	19.1	51.6	7.4	153.0	225.2	**2,081.8**	1,657.4	125.0	69.0
11-Dec-95	1,763.0	2.4	1,765.4	41.7	17.3	39.9	7.9	106.8	226.9	**1,885.6**	1,678.2	103.1	68.0
12-Dec-95	1,927.0	2.5	1,929.5	120.7	17.3	63.4	7.6	209.0	225.7	**1,946.3**	1,673.4	141.6	74.0
13-Dec-95	2,176.0	1.4	2,177.4	40.8	20.4	55.8	7.4	124.5	226.3	**2,279.1**	1,683.5	279.3	88.0
14-Dec-95	2,359.0	1.7	2,360.7	134.9	18.6	270.1	7.4	431.0	230.0	**2,159.7**	1,684.3	713.6	75.0
15-Dec-95	2,470.0	1.3	2,471.3	85.2	17.9	93.1	7.0	203.2	228.2	**2,496.3**	1,679.6	318.7	80.0
16-Dec-95	2,155.0	1.1	2,156.1	44.5	18.9	47.9	6.9	118.1	224.0	**2,262.0**	1,689.9	159.4	78.0
17-Dec-95	1,998.0	0.7	1,998.7	98.1	18.7	61.5	6.7	184.9	224.8	**2,038.6**	1,686.0	181.0	75.0
18-Dec-95	2,071.0	1.2	2,072.2	79.2	17.8	89.3	6.9	193.2	226.7	**2,105.7**	1,689.8	291.8	82.0
19-Dec-95	2,000.0	0.9	2,000.9	50.1	21.3	64.3	6.6	142.4	227.0	**2,085.6**	1,701.0	249.0	97.0
20-Dec-95	1,802.0	2.4	1,804.4	44.5	17.4	41.4	6.8	110.1	226.9	**1,921.2**	1,681.6	127.2	72.0
21-Dec-95	1,855.0	3.5	1,858.5	109.6	17.9	59.9	6.7	194.1	227.9	**1,892.3**	1,682.8	143.8	88.0
22-Dec-95	1,872.0	5.0	1,877.0	41.7	18.8	36.3	6.6	103.4	225.4	**1,999.0**	1,673.1	93.9	79.0
23-Dec-95	2,036.0	4.7	2,040.7	60.9	19.3	40.7	5.8	126.8	224.6	**2,138.6**	1,645.0	100.3	75.0
24-Dec-95	1,844.0	3.0	1,847.0	93.6	17.2	51.4	4.7	166.9	224.3	**1,904.4**	1,653.4	109.3	71.0
25-Dec-95	1,840.0	1.6	1,841.6	41.3	18.2	33.8	4.9	98.2	222.7	**1,966.1**	1,566.7	78.3	77.0
26-Dec-95	1,820.0	1.4	1,821.4	58.7	18.7	38.2	5.4	121.0	222.9	**1,923.3**	1,630.7	81.4	82.0
27-Dec-95	1,847.0	1.5	1,848.5	92.9	19.1	49.6	5.5	167.1	223.2	**1,904.6**	1,649.7	103.6	70.0
28-Dec-95	1,959.0	1.6	1,960.6	57.1	18.5	37.0	5.5	118.1	226.2	**2,068.8**	1,647.9	87.5	88.0
29-Dec-95	1,735.0	1.4	1,736.4	41.9	18.9	32.1	5.9	98.7	225.2	**1,862.9**	1,653.0	74.7	66.0
30-Dec-95	1,880.0	1.7	1,881.7	69.6	18.1	88.0	5.4	181.1	223.6	**1,924.3**	1,643.6	204.8	71.0
31-Dec-95	2,025.0	1.9	2,026.9	75.7	17.7	75.8	5.9	175.2	223.4	**2,075.2**	1,614.1	237.7	68.0
Averages	1,964.3	2.0	1,966.3	67.8	18.4	60.4	6.8	153.4	225.4	**2,038.3**	1,649.8	177.3	75.4

Lake Michigan Diversion Accounting – WY 1996
January 1996 – Summary of Diversion Flows (All in cfs)

LAKE MICHIGAN DIVERSION ACCOUNTING WY 1996	ROMEOVILLE AVM GAGE RECORD	DIVERSIONS ABOVE THE GAGE	TOTAL FLOW THROUGH THE CANAL	GROUNDWATER PUMPAGE DISCHARGED INTO THE CANAL	WATER SUPPLY PUMPAGE FROM INDIANA REACHING THE CANAL	RUNOFF FROM THE DES PLAINES RIVER WATERSHED REACHING THE CANAL	LAKE MICHIGAN PUMPAGE BY FEDERAL FACILITIES DISCHARGED TO THE CANAL	TOTAL DEDUCTION FROM THE ROMEOVILLE GAGE RECORD	LAKE MICHIGAN PUMPAGE NOT DISCHARGED TO THE CANAL	**TOTAL DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS**	PUMPAGE FROM LAKE MICHIGAN ACCOUNTABLE TO THE STATE OF ILLINOIS	RUNOFF FROM THE DIVERTED LAKE MICHIGAN WATERSHED	DIRECT DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS
DATE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
01-Jan-96	1,848.0	1.9	1,849.9	54.0	18.8	39.4	6.4	118.6	172.5	**1,903.8**	1,590.5	102.4	79.0
02-Jan-96	1,789.0	1.8	1,790.8	37.2	19.6	33.5	6.5	96.8	176.8	**1,870.8**	1,633.2	98.1	93.0
03-Jan-96	1,836.0	3.4	1,839.4	97.2	17.6	50.0	6.7	171.5	178.8	**1,846.7**	1,667.0	114.9	84.0
04-Jan-96	1,754.0	5.0	1,759.0	41.5	18.3	31.8	6.7	98.3	177.0	**1,837.7**	1,658.7	75.2	80.0
05-Jan-96	2,006.0	2.8	2,008.8	96.6	17.0	49.0	6.8	169.3	175.6	**2,015.1**	1,626.9	99.9	87.0
06-Jan-96	1,855.0	1.9	1,856.9	41.2	18.5	30.6	6.6	96.9	178.2	**1,938.3**	1,632.0	66.4	88.0
07-Jan-96	1,715.0	1.5	1,716.5	53.6	19.1	34.5	6.5	113.7	174.9	**1,777.7**	1,619.6	69.7	84.0
08-Jan-96	1,777.0	1.0	1,778.0	96.5	17.9	46.7	7.2	168.4	167.0	**1,776.6**	1,659.7	93.1	85.0
09-Jan-96	1,955.0	1.1	1,956.1	60.7	17.6	38.0	6.8	123.1	172.0	**2,005.0**	1,630.5	73.7	87.0
10-Jan-96	1,815.0	1.5	1,816.5	37.2	17.9	28.4	5.6	89.1	176.0	**1,903.5**	1,653.4	59.9	82.0
11-Jan-96	1,761.0	1.3	1,762.3	111.7	17.8	50.4	6.8	186.7	176.5	**1,752.1**	1,638.6	100.9	76.0
12-Jan-96	1,925.0	1.5	1,926.5	37.2	16.9	27.4	6.8	88.3	177.7	**2,016.0**	1,642.7	59.3	75.0
13-Jan-96	2,245.0	1.8	2,246.8	157.8	18.7	270.5	6.8	453.9	178.5	**1,971.3**	1,636.2	861.3	65.0
14-Jan-96	1,866.0	2.2	1,868.2	243.0	18.1	285.4	6.7	553.2	177.7	**1,492.7**	1,617.6	1,093.9	92.0
15-Jan-96	1,815.0	2.0	1,817.0	63.5	18.3	54.8	7.5	144.0	177.9	**1,850.9**	1,652.7	169.6	72.0
16-Jan-96	1,892.0	1.3	1,893.3	37.2	17.1	57.4	8.9	120.7	177.6	**1,950.3**	1,665.1	203.7	71.0
17-Jan-96	2,722.0	1.2	2,723.2	193.0	18.6	311.4	7.4	530.4	177.6	**2,370.4**	1,635.9	1,214.5	75.0
18-Jan-96	4,240.0	0.8	4,240.8	164.6	16.5	896.4	6.5	1,084.0	180.6	**3,337.5**	1,635.3	4,301.5	167.0
19-Jan-96	3,777.0	0.4	3,777.4	311.6	17.0	320.3	6.8	655.7	175.0	**3,296.7**	1,648.6	1,403.4	72.0
20-Jan-96	3,133.0	1.5	3,134.5	120.6	20.4	169.8	5.3	316.2	175.6	**2,993.9**	1,627.3	655.2	60.0
21-Jan-96	2,941.0	3.6	2,944.6	37.2	17.9	95.0	6.3	156.5	175.6	**2,963.7**	1,145.3	381.4	70.0
22-Jan-96	2,580.0	3.4	2,583.4	84.5	17.5	80.4	7.1	189.6	178.8	**2,572.6**	1,642.6	296.7	73.0
23-Jan-96	2,106.0	1.7	2,107.7	60.2	18.3	120.5	7.0	206.0	175.9	**2,077.5**	1,613.4	498.8	84.0
24-Jan-96	2,660.0	0.5	2,660.5	75.1	18.3	73.4	7.0	173.7	177.2	**2,664.0**	1,642.1	284.3	77.0
25-Jan-96	1,926.0	0.7	1,926.7	57.7	16.9	55.3	6.8	136.7	176.0	**1,965.9**	1,643.0	184.3	88.0
26-Jan-96	2,710.0	1.1	2,711.1	101.0	17.8	421.5	7.0	547.3	177.0	**2,340.7**	1,642.7	1,650.7	92.0
27-Jan-96	2,798.0	1.4	2,799.4	299.7	18.4	226.4	6.9	551.3	172.3	**2,420.4**	1,621.3	622.9	70.0
28-Jan-96	2,403.0	2.7	2,405.7	52.2	19.6	102.4	6.7	180.8	176.1	**2,401.0**	1,630.5	270.1	81.0
29-Jan-96	2,277.0	2.4	2,279.4	41.6	17.9	94.7	6.9	161.0	179.4	**2,297.7**	1,626.9	229.4	71.0
30-Jan-96	1,670.0	2.3	1,672.3	71.4	17.6	71.4	6.9	167.2	174.0	**1,679.1**	1,654.7	184.6	76.0
31-Jan-96	2,002.0	2.4	2,004.4	65.3	17.9	63.4	7.3	153.9	180.3	**2,030.8**	1,677.5	150.5	110.0
Averages	2,251.6	1.9	2,253.5	96.8	18.1	136.5	6.8	258.2	176.3	**2,171.6**	1,623.0	505.5	82.8

Lake Michigan Diversion Accounting – WY 1996
February 1996 – Summary of Diversion Flows (All in cfs)

LAKE MICHIGAN DIVERSION ACCOUNTING WY 1996	ROMEOVILLE AVM GAGE RECORD	DIVERSIONS ABOVE THE GAGE	TOTAL FLOW THROUGH THE CANAL	GROUNDWATER PUMPAGE DISCHARGED INTO THE CANAL	WATER SUPPLY PUMPAGE FROM INDIANA REACHING THE CANAL	RUNOFF FROM THE DES PLAINES RIVER WATERSHED REACHING THE CANAL	LAKE MICHIGAN PUMPAGE BY FEDERAL FACILITIES DISCHARGED TO THE CANAL	TOTAL DEDUCTION FROM THE ROMEOVILLE GAGE RECORD	LAKE MICHIGAN PUMPAGE NOT DISCHARGED TO THE CANAL	**TOTAL DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS**	PUMPAGE FROM LAKE MICHIGAN ACCOUNTABLE TO THE STATE OF ILLINOIS	RUNOFF FROM THE DIVERTED LAKE MICHIGAN WATERSHED	DIRECT DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS
DATE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
01-Feb-96	2,170.0	2.0	2,172.0	70.7	19.4	60.5	7.6	158.2	234.5	**2,248.4**	1,716.8	139.4	100.0
02-Feb-96	2,001.0	4.2	2,005.2	44.7	18.9	49.4	9.3	122.4	236.4	**2,119.2**	1,785.2	125.9	114.0
03-Feb-96	2,067.0	1.6	2,068.6	108.1	20.0	68.5	7.6	204.2	242.0	**2,106.3**	1,788.6	148.0	107.0
04-Feb-96	2,089.0	1.7	2,090.7	41.7	19.7	45.9	7.9	115.1	243.5	**2,219.1**	1,798.5	107.5	92.0
05-Feb-96	2,274.0	1.7	2,275.7	56.1	18.9	48.7	8.2	131.9	241.7	**2,385.5**	1,822.2	115.1	94.0
06-Feb-96	1,858.0	2.9	1,860.9	86.9	18.6	58.4	9.0	172.8	243.7	**1,931.8**	1,844.8	126.1	71.0
07-Feb-96	2,256.0	3.7	2,259.7	55.1	18.6	123.8	8.4	205.9	238.6	**2,292.4**	1,763.8	321.8	54.0
08-Feb-96	2,814.0	3.7	2,817.7	133.3	18.5	228.7	8.3	388.8	240.2	**2,669.1**	1,766.1	751.2	70.0
09-Feb-96	1,997.0	2.5	1,999.5	62.3	19.0	77.2	7.7	166.2	237.2	**2,070.5**	1,766.1	307.5	66.0
10-Feb-96	1,928.0	2.3	1,930.3	37.2	19.1	58.2	7.5	122.0	235.8	**2,044.1**	1,747.2	227.9	64.0
11-Feb-96	2,183.0	2.2	2,185.2	73.4	19.1	62.5	7.5	162.4	237.0	**2,259.8**	1,695.8	210.0	74.0
12-Feb-96	2,068.0	2.9	2,070.9	75.1	19.0	59.3	8.2	161.6	236.5	**2,145.8**	1,735.3	164.0	87.0
13-Feb-96	2,014.0	4.2	2,018.2	37.2	19.4	46.9	8.2	111.7	238.4	**2,145.0**	1,731.5	120.7	71.0
14-Feb-96	2,141.0	3.8	2,144.8	75.6	19.1	57.0	7.0	158.7	232.4	**2,218.5**	1,689.1	143.7	90.0
15-Feb-96	1,941.0	2.9	1,943.9	44.6	18.5	46.2	7.0	116.4	232.7	**2,060.2**	1,682.7	119.0	96.0
16-Feb-96	1,759.0	1.8	1,760.8	103.7	18.5	65.2	7.1	194.4	234.6	**1,801.0**	1,712.6	143.1	68.0
17-Feb-96	2,000.0	2.0	2,002.0	41.7	19.2	44.6	7.0	112.5	234.3	**2,123.8**	1,653.7	106.0	87.0
18-Feb-96	1,756.0	1.5	1,757.5	58.6	18.5	48.9	6.8	132.7	235.0	**1,859.8**	1,667.1	111.4	76.0
19-Feb-96	1,773.0	1.9	1,774.9	79.9	18.1	56.1	6.4	160.5	236.0	**1,850.4**	1,705.9	115.2	58.0
20-Feb-96	2,029.0	3.3	2,032.3	57.0	16.8	47.3	6.8	127.8	235.6	**2,140.1**	1,661.9	107.9	64.0
21-Feb-96	1,771.0	2.7	1,773.7	37.2	18.5	41.8	7.2	104.7	233.0	**1,902.0**	1,657.8	101.2	85.0
22-Feb-96	1,748.0	2.0	1,750.0	101.3	18.7	60.6	7.3	187.9	234.3	**1,796.4**	1,654.0	136.0	79.0
23-Feb-96	2,105.0	1.8	2,106.8	61.1	16.9	47.1	7.0	132.0	232.4	**2,207.2**	1,679.7	118.9	67.0
24-Feb-96	1,843.0	2.4	1,845.4	56.7	19.9	46.4	6.7	129.6	233.0	**1,948.8**	1,657.1	117.1	80.0
25-Feb-96	1,776.0	2.6	1,778.6	41.2	18.4	40.2	6.6	106.4	235.6	**1,907.7**	1,660.3	112.0	84.0
26-Feb-96	2,673.0	2.4	2,675.4	99.3	19.7	84.4	6.9	210.3	236.7	**2,701.9**	1,667.2	428.0	79.0
27-Feb-96	4,239.0	2.2	4,241.2	245.7	17.5	484.8	6.7	754.6	238.2	**3,724.8**	1,650.4	3,631.0	220.0
28-Feb-96	3,771.0	2.1	3,773.1	273.9	18.6	182.6	7.1	482.1	235.0	**3,526.0**	1,671.8	1,358.1	81.0
29-Feb-96	2,536.0	2.0	2,538.0	54.2	18.1	81.0	7.5	160.8	232.0	**2,609.3**	1,676.9	570.4	75.0
Averages	2,192.4	2.5	2,194.9	79.8	18.7	83.5	7.5	189.5	236.4	**2,241.8**	1,714.1	354.6	84.6

Lake Michigan Diversion Accounting – WY 1996
March 1996 – Summary of Diversion Flows (All in cfs)

LAKE MICHIGAN DIVERSION ACCOUNTING WY 1996	ROMEOVILLE AVM GAGE RECORD	DIVERSIONS ABOVE THE GAGE	TOTAL FLOW THROUGH THE CANAL	GROUNDWATER PUMPAGE DISCHARGED INTO THE CANAL	WATER SUPPLY PUMPAGE FROM INDIANA REACHING THE CANAL	RUNOFF FROM THE DES PLAINES RIVER WATERSHED REACHING THE CANAL	LAKE MICHIGAN PUMPAGE BY FEDERAL FACILITIES DISCHARGED TO THE CANAL	TOTAL DEDUCTION FROM THE ROMEOVILLE GAGE RECORD	LAKE MICHIGAN PUMPAGE NOT DISCHARGED TO THE CANAL	**TOTAL DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS**	PUMPAGE FROM LAKE MICHIGAN ACCOUNTABLE TO THE STATE OF ILLINOIS	RUNOFF FROM THE DIVERTED LAKE MICHIGAN WATERSHED	DIRECT DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS
DATE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
01-Mar-96	2,663.0	2.1	2,665.1	37.2	17.5	59.8	6.9	121.4	223.8	**2,767.4**	1,652.2	360.4	68.0
02-Mar-96	2,152.0	2.0	2,154.0	65.8	18.7	59.3	5.2	149.0	221.1	**2,226.1**	1,634.2	279.2	72.0
03-Mar-96	2,127.0	1.6	2,128.6	77.6	18.2	57.8	5.1	158.8	222.7	**2,192.6**	1,625.7	210.9	63.0
04-Mar-96	1,952.0	1.6	1,953.6	50.7	17.8	61.0	5.5	135.0	223.6	**2,042.2**	1,682.5	202.5	76.0
05-Mar-96	3,140.0	1.0	3,141.0	199.9	18.1	535.4	7.2	760.5	228.8	**2,609.3**	1,668.3	1,674.1	91.0
06-Mar-96	2,314.0	0.8	2,314.8	226.0	19.8	196.6	6.8	449.1	225.4	**2,091.1**	1,648.8	951.2	95.0
07-Mar-96	2,385.0	1.3	2,386.3	60.4	18.4	87.2	6.6	172.5	221.2	**2,435.0**	1,669.1	240.5	91.0
08-Mar-96	2,072.0	0.5	2,072.5	114.6	16.8	85.1	6.4	222.8	223.9	**2,073.5**	1,650.8	232.8	79.0
09-Mar-96	2,105.0	0.3	2,105.3	37.2	18.8	51.8	6.1	113.8	223.0	**2,214.5**	1,683.5	238.7	76.0
10-Mar-96	2,112.0	1.8	2,113.8	146.8	18.2	177.3	6.2	348.5	223.8	**1,989.1**	1,659.2	868.6	59.0
11-Mar-96	2,069.0	2.9	2,071.9	223.2	18.0	238.2	6.6	486.0	229.5	**1,815.4**	1,669.7	1,280.1	69.0
12-Mar-96	2,307.0	3.2	2,310.2	85.9	17.8	84.5	6.5	194.7	224.9	**2,340.4**	1,663.3	583.8	64.0
13-Mar-96	2,227.0	2.1	2,229.1	41.3	19.3	52.5	6.7	119.8	225.2	**2,334.5**	1,670.1	334.0	74.0
14-Mar-96	2,451.0	1.2	2,452.2	113.5	17.5	70.8	6.8	208.6	223.6	**2,467.3**	1,666.5	325.8	80.0
15-Mar-96	1,840.0	1.7	1,841.7	41.5	17.2	45.4	5.9	110.0	222.0	**1,953.8**	1,643.0	263.4	72.0
16-Mar-96	2,598.0	4.1	2,602.1	63.0	18.4	50.4	5.7	137.4	226.1	**2,690.8**	1,649.1	253.3	78.0
17-Mar-96	1,872.0	3.0	1,875.0	37.2	17.7	42.9	6.1	103.9	224.0	**1,995.1**	1,637.3	211.8	86.0
18-Mar-96	2,098.0	1.6	2,099.6	110.6	18.0	64.1	5.8	198.5	225.0	**2,126.1**	1,636.2	235.7	71.0
19-Mar-96	1,984.0	1.7	1,985.7	37.2	18.2	42.1	5.5	103.0	221.9	**2,104.6**	1,644.5	189.9	83.0
20-Mar-96	1,883.0	4.2	1,887.2	60.3	46.3	47.9	6.3	160.8	225.0	**1,951.4**	1,652.8	211.5	110.0
21-Mar-96	2,145.0	5.9	2,150.9	50.6	17.4	45.0	6.1	119.1	223.3	**2,255.1**	1,660.9	178.0	93.0
22-Mar-96	1,789.0	5.4	1,794.4	85.9	20.2	56.3	6.2	168.6	224.6	**1,850.5**	1,662.1	175.9	77.0
23-Mar-96	2,003.0	2.8	2,005.8	51.5	17.9	44.5	6.0	119.9	222.3	**2,108.2**	1,645.2	150.1	77.0
24-Mar-96	1,992.0	2.8	1,994.8	96.9	17.6	65.7	7.1	187.3	224.0	**2,031.5**	1,634.7	304.6	87.0
25-Mar-96	2,972.0	1.8	2,973.8	139.9	19.5	298.7	6.1	464.1	224.7	**2,734.4**	1,649.3	1,103.1	53.0
26-Mar-96	2,243.0	1.7	2,244.7	99.2	17.5	76.7	6.7	200.0	221.8	**2,266.5**	1,646.4	365.4	67.0
27-Mar-96	2,251.0	2.2	2,253.2	41.5	17.3	49.6	6.6	114.9	222.3	**2,360.5**	1,633.3	239.9	71.0
28-Mar-96	2,208.0	2.1	2,210.1	108.2	17.7	67.5	6.2	199.5	222.6	**2,233.2**	1,655.3	242.6	98.0
29-Mar-96	1,939.0	1.7	1,940.7	41.7	17.7	41.9	7.0	108.2	222.5	**2,055.1**	1,640.7	184.2	75.0
30-Mar-96	2,010.0	1.9	2,011.9	54.5	18.2	43.8	6.6	123.1	220.0	**2,108.8**	1,628.9	179.8	78.0
31-Mar-96	1,878.0	2.1	1,880.1	87.3	18.1	93.3	4.8	203.5	223.2	**1,899.8**	1,614.7	332.9	86.0
Averages	2,186.5	2.2	2,188.7	86.7	19.0	96.6	6.2	208.5	223.7	**2,203.9**	1,650.9	406.6	78.0

Lake Michigan Diversion Accounting – WY 1996
April 1996 – Summary of Diversion Flows (All in cfs)

LAKE MICHIGAN DIVERSION ACCOUNTING WY 1996	ROMEOVILLE AVM GAGE RECORD	DIVERSIONS ABOVE THE GAGE	TOTAL FLOW THROUGH THE CANAL	GROUNDWATER PUMPAGE DISCHARGED INTO THE CANAL	WATER SUPPLY PUMPAGE FROM INDIANA REACHING THE CANAL	RUNOFF FROM THE DES PLAINES RIVER WATERSHED REACHING THE CANAL	LAKE MICHIGAN PUMPAGE BY FEDERAL FACILITIES DISCHARGED TO THE CANAL	TOTAL DEDUCTION FROM THE ROMEOVILLE GAGE RECORD	LAKE MICHIGAN PUMPAGE NOT DISCHARGED TO THE CANAL	**TOTAL DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS**	PUMPAGE FROM LAKE MICHIGAN ACCOUNTABLE TO THE STATE OF ILLINOIS	RUNOFF FROM THE DIVERTED LAKE MICHIGAN WATERSHED	DIRECT DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS
DATE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
01-Apr-96	2,126.0	2.2	2,128.2	54.6	17.1	51.0	6.3	129.0	231.8	**2,231.0**	1,649.3	189.5	73.0
02-Apr-96	2,004.0	2.6	2,006.6	37.2	17.4	40.3	6.0	100.9	232.1	**2,137.8**	1,663.0	161.9	76.0
03-Apr-96	2,080.0	3.2	2,083.2	109.4	17.8	61.7	6.0	194.9	233.0	**2,121.3**	1,656.4	203.1	90.0
04-Apr-96	1,720.0	2.2	1,722.2	41.9	20.1	39.8	6.1	107.9	231.1	**1,845.5**	1,654.1	173.4	88.0
05-Apr-96	2,038.0	2.0	2,040.0	54.4	18.9	42.5	6.5	122.3	230.4	**2,148.1**	1,632.8	159.3	72.0
06-Apr-96	1,613.0	2.3	1,615.3	37.2	18.9	36.0	5.7	97.8	231.1	**1,748.6**	1,649.5	136.3	97.0
07-Apr-96	1,784.0	2.4	1,786.4	92.2	17.4	53.1	5.8	168.4	231.3	**1,849.3**	1,548.7	163.9	72.0
08-Apr-96	1,923.0	2.4	1,925.4	51.2	18.1	40.1	6.2	115.6	232.2	**2,042.0**	1,657.4	133.6	84.0
09-Apr-96	1,896.0	2.2	1,898.2	87.7	17.3	50.1	5.6	160.7	233.2	**1,970.7**	1,664.8	145.6	83.0
10-Apr-96	1,710.0	2.4	1,712.4	55.5	17.4	39.9	6.3	119.1	231.2	**1,824.5**	1,669.7	127.7	76.0
11-Apr-96	1,820.0	2.5	1,822.5	42.0	15.8	34.9	6.7	99.4	232.1	**1,955.2**	1,708.2	117.2	71.0
12-Apr-96	2,156.0	2.4	2,158.4	49.9	17.8	35.4	6.7	109.8	236.2	**2,284.7**	1,668.7	133.7	102.0
13-Apr-96	2,047.0	2.0	2,049.0	79.6	18.6	49.4	6.5	154.2	230.9	**2,125.7**	1,618.0	206.4	124.0
14-Apr-96	2,106.0	1.6	2,107.6	56.5	18.6	141.7	6.2	223.0	233.9	**2,118.4**	1,613.8	234.0	107.0
15-Apr-96	3,538.0	1.8	3,539.8	206.4	17.7	593.8	6.0	823.9	233.3	**2,949.3**	1,634.2	2,884.9	114.0
16-Apr-96	2,715.0	1.6	2,716.6	233.3	17.9	214.7	6.1	472.0	231.7	**2,476.3**	1,658.0	874.0	91.0
17-Apr-96	2,708.0	1.6	2,709.6	57.4	17.7	79.1	6.6	160.9	231.5	**2,780.2**	1,658.4	372.5	90.0
18-Apr-96	2,479.0	2.0	2,481.0	60.3	17.6	124.3	6.6	208.9	231.9	**2,504.1**	1,670.3	421.8	95.0
19-Apr-96	3,254.0	2.2	3,256.2	139.1	19.2	594.9	7.7	760.8	231.0	**2,726.4**	1,648.8	2,197.5	98.0
20-Apr-96	4,770.0	2.0	4,772.0	211.3	18.9	213.7	6.5	450.4	229.4	**4,551.0**	1,621.6	1,578.5	85.0
21-Apr-96	4,054.0	1.3	4,055.3	58.1	18.1	102.8	5.6	184.6	230.2	**4,100.9**	1,626.2	825.9	134.0
22-Apr-96	3,605.0	0.6	3,605.6	76.5	18.3	161.9	6.3	263.1	232.5	**3,574.9**	1,634.5	1,541.2	99.0
23-Apr-96	3,197.0	0.5	3,197.5	108.6	18.1	85.0	6.6	218.3	232.8	**3,212.0**	1,659.0	935.3	107.0
24-Apr-96	3,112.0	0.5	3,112.5	42.2	18.1	53.2	6.8	120.2	231.3	**3,223.6**	1,667.5	591.4	114.0
25-Apr-96	2,813.0	1.0	2,814.0	54.0	18.6	50.0	6.5	129.0	229.6	**2,914.6**	1,664.4	470.6	103.0
26-Apr-96	2,945.0	1.9	2,946.9	90.8	18.8	58.7	6.6	174.9	232.8	**3,004.8**	1,657.7	397.5	115.0
27-Apr-96	2,233.0	1.1	2,234.1	51.4	18.4	44.7	6.0	120.6	231.4	**2,344.9**	1,660.3	297.9	150.0
28-Apr-96	2,362.0	1.1	2,363.1	41.8	19.6	40.2	6.4	108.0	234.1	**2,489.2**	1,623.5	247.0	125.0
29-Apr-96	4,012.0	1.1	4,013.1	183.2	21.1	430.1	6.4	640.8	234.9	**3,607.2**	1,655.9	2,407.5	86.0
30-Apr-96	3,301.0	0.9	3,301.9	255.1	19.1	157.2	6.2	437.5	231.4	**3,095.8**	1,648.4	921.8	108.0
Averages	2,604.0	1.8	2,605.8	90.6	18.3	124.0	6.3	239.2	232.0	**2,598.6**	1,648.1	641.7	97.6

Lake Michigan Diversion Accounting – WY 1996
May 1996 – Summary of Diversion Flows (All in cfs)

LAKE MICHIGAN DIVERSION ACCOUNTING WY 1996	ROMEOVILLE AVM GAGE RECORD	DIVERSIONS ABOVE THE GAGE	TOTAL FLOW THROUGH THE CANAL	GROUNDWATER PUMPAGE DISCHARGED INTO THE CANAL	WATER SUPPLY PUMPAGE FROM INDIANA REACHING THE CANAL	RUNOFF FROM THE DES PLAINES RIVER WATERSHED REACHING THE CANAL	LAKE MICHIGAN PUMPAGE BY FEDERAL FACILITIES DISCHARGED TO THE CANAL	TOTAL DEDUCTION FROM THE ROMEOVILLE GAGE RECORD	LAKE MICHIGAN PUMPAGE NOT DISCHARGED TO THE CANAL	**TOTAL DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS**	PUMPAGE FROM LAKE MICHIGAN ACCOUNTABLE TO THE STATE OF ILLINOIS	RUNOFF FROM THE DIVERTED LAKE MICHIGAN WATERSHED	DIRECT DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS
DATE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
01-May-96	3,255.0	1.0	3,256.0	56.1	18.7	70.4	6.6	151.9	239.2	**3,343.3**	1,661.7	521.8	111.0
02-May-96	2,994.0	1.5	2,995.5	37.2	19.8	51.8	6.7	115.6	238.0	**3,117.9**	1,680.8	378.5	150.0
03-May-96	2,453.0	2.5	2,455.5	49.2	20.9	49.4	6.2	125.8	239.9	**2,569.7**	1,688.8	312.1	163.0
04-May-96	2,788.0	2.3	2,790.3	79.0	20.8	55.3	8.5	163.6	238.7	**2,865.4**	1,661.6	312.9	178.0
05-May-96	2,187.0	1.8	2,188.8	55.6	20.8	45.8	7.7	129.8	239.4	**2,298.4**	1,607.5	290.5	152.0
06-May-96	2,415.0	1.8	2,416.8	63.2	21.9	45.9	7.1	138.1	239.0	**2,517.7**	1,690.1	275.2	142.0
07-May-96	2,442.0	2.0	2,444.0	65.4	21.6	46.1	6.5	139.6	239.4	**2,543.8**	1,671.9	259.7	138.0
08-May-96	2,230.0	2.6	2,232.6	41.7	21.9	38.1	6.7	108.4	239.0	**2,363.2**	1,662.7	246.5	136.0
09-May-96	5,687.0	2.3	5,689.3	125.3	21.4	732.8	6.9	886.5	248.9	**5,051.8**	1,670.3	6,555.4	394.0
10-May-96	8,234.0	1.3	8,235.3	226.7	27.6	756.5	6.6	1,017.3	243.1	**7,461.1**	1,652.1	5,229.7	250.0
11-May-96	5,659.0	2.3	5,661.3	283.9	25.4	295.4	6.5	611.2	238.5	**5,288.6**	1,626.2	2,530.4	169.0
12-May-96	4,600.0	1.4	4,601.4	145.1	20.6	173.6	6.5	345.7	237.8	**4,493.4**	1,615.0	1,314.2	156.0
13-May-96	3,895.0	1.9	3,896.9	60.9	19.6	124.8	6.9	212.1	239.8	**3,924.7**	1,681.2	1,158.2	134.0
14-May-96	3,837.0	2.4	3,839.4	83.1	18.8	95.6	6.8	204.3	242.9	**3,878.1**	1,658.8	941.1	153.0
15-May-96	2,932.0	2.3	2,934.3	70.6	21.7	82.2	5.3	179.7	241.6	**2,996.2**	1,679.0	765.9	150.0
16-May-96	3,368.0	2.2	3,370.2	56.6	22.1	231.5	7.2	317.4	241.4	**3,294.2**	1,651.1	826.2	137.0
17-May-96	3,681.0	2.9	3,683.9	270.1	20.6	262.2	7.2	560.1	242.1	**3,365.9**	1,715.6	1,518.4	183.0
18-May-96	4,070.0	2.1	4,072.1	51.4	21.4	105.0	7.4	185.2	247.8	**4,134.7**	1,887.6	1,246.2	201.0
19-May-96	3,666.0	2.5	3,668.5	41.6	20.9	80.7	7.3	150.5	245.4	**3,763.4**	1,939.1	885.2	175.0
20-May-96	4,649.0	2.3	4,651.3	136.6	19.3	335.3	7.6	498.8	247.3	**4,399.9**	1,806.6	2,151.4	827.0
21-May-96	4,459.0	2.3	4,461.3	176.1	19.4	159.7	7.4	362.6	240.2	**4,338.9**	1,774.9	2,233.4	166.0
22-May-96	4,519.0	2.6	4,521.6	57.3	19.3	91.3	8.5	176.4	242.1	**4,587.3**	1,805.2	1,607.9	174.0
23-May-96	4,571.0	1.5	4,572.5	139.4	20.5	221.7	7.8	389.4	245.1	**4,428.3**	1,730.2	1,753.8	147.0
24-May-96	5,244.0	1.3	5,245.3	200.7	19.0	713.7	7.6	941.0	243.2	**4,547.5**	1,683.4	2,976.8	362.0
25-May-96	4,508.0	1.7	4,509.7	277.4	21.6	296.4	7.4	602.8	239.5	**4,146.4**	1,656.8	1,488.8	219.0
26-May-96	4,134.0	1.6	4,135.6	51.1	25.5	125.4	7.3	209.2	239.4	**4,165.8**	1,611.7	1,010.8	203.0
27-May-96	5,089.0	1.1	5,090.1	154.7	27.0	610.3	7.4	799.3	239.7	**4,530.5**	1,593.8	3,739.5	202.0
28-May-96	8,904.0	0.4	8,904.4	200.8	28.0	2,061.3	7.5	2,297.6	256.2	**6,863.0**	1,662.9	15,137.1	86.0
29-May-96	13,165.0	0.6	13,165.6	87.6	28.2	732.5	7.3	855.5	244.3	**12,554.4**	1,696.2	6,625.9	39.0
30-May-96	8,399.0	0.2	8,399.2	171.3	24.1	496.6	7.3	699.3	243.7	**7,943.7**	1,727.9	4,251.3	112.0
31-May-96	6,749.0	0.6	6,749.6	241.6	24.4	374.7	7.4	647.9	241.3	**6,342.9**	1,740.7	2,298.3	397.0
Averages	4,670.4	1.8	4,672.2	121.2	22.0	308.4	7.1	458.7	242.1	**4,455.6**	1,696.5	2,285.3	200.2

Lake Michigan Diversion Accounting – WY 1996
June 1996 – Summary of Diversion Flows (All in cfs)

LAKE MICHIGAN DIVERSION ACCOUNTING WY 1996	ROMEOVILLE AVM GAGE RECORD	DIVERSIONS ABOVE THE GAGE	TOTAL FLOW THROUGH THE CANAL	GROUNDWATER PUMPAGE DISCHARGED INTO THE CANAL	WATER SUPPLY PUMPAGE FROM INDIANA REACHING THE CANAL	RUNOFF FROM THE DES PLAINES RIVER WATERSHED REACHING THE CANAL	LAKE MICHIGAN PUMPAGE BY FEDERAL FACILITIES DISCHARGED TO THE CANAL	TOTAL DEDUCTION FROM THE ROMEOVILLE GAGE RECORD	LAKE MICHIGAN PUMPAGE NOT DISCHARGED TO THE CANAL	**TOTAL DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS**	PUMPAGE FROM LAKE MICHIGAN ACCOUNTABLE TO THE STATE OF ILLINOIS	RUNOFF FROM THE DIVERTED LAKE MICHIGAN WATERSHED	DIRECT DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS
DATE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
01-Jun-96	6,273.0	0.5	6,273.5	221.8	22.5	672.1	7.4	923.7	261.1	**5,610.8**	1,721.5	3,118.7	438.0
02-Jun-96	6,301.0	0.7	6,301.7	251.7	29.4	479.4	6.7	767.3	260.2	**5,794.6**	1,707.3	2,438.0	545.0
03-Jun-96	4,945.0	0.5	4,945.5	191.3	22.8	324.5	7.3	545.8	258.5	**4,658.2**	1,724.6	1,607.9	555.0
04-Jun-96	5,657.0	0.7	5,657.7	105.7	26.9	805.5	7.1	945.3	259.3	**4,971.7**	1,710.0	2,208.7	436.0
05-Jun-96	4,985.0	0.6	4,985.6	196.9	25.1	350.5	7.4	580.0	257.4	**4,663.1**	1,741.3	1,504.2	549.0
06-Jun-96	5,525.0	0.7	5,525.7	103.4	26.5	285.9	7.4	423.2	259.6	**5,362.1**	1,741.4	1,395.2	851.0
07-Jun-96	4,367.0	0.5	4,367.5	111.9	59.2	248.3	7.9	427.2	259.4	**4,199.7**	1,722.0	1,241.3	789.0
08-Jun-96	4,546.0	0.4	4,546.4	37.2	41.6	156.9	7.0	242.7	254.3	**4,558.0**	1,664.4	1,049.3	581.0
09-Jun-96	4,418.0	0.4	4,418.4	73.9	43.7	388.1	8.2	513.8	258.8	**4,163.3**	1,630.0	2,751.8	304.0
10-Jun-96	4,546.0	0.6	4,546.6	215.2	24.9	406.8	7.0	653.9	260.0	**4,152.7**	1,697.9	1,816.9	451.0
11-Jun-96	4,007.0	0.6	4,007.6	150.7	30.6	258.2	6.6	446.1	258.2	**3,819.7**	1,712.8	1,296.8	377.0
12-Jun-96	4,054.0	0.8	4,054.8	94.6	28.8	187.3	6.7	317.4	260.0	**3,997.4**	1,790.7	1,002.8	528.0
13-Jun-96	3,902.0	0.9	3,902.9	60.9	27.5	148.7	7.9	245.0	259.7	**3,917.6**	1,868.4	732.4	646.0
14-Jun-96	3,465.0	2.0	3,467.0	40.1	26.0	125.8	8.6	200.5	264.4	**3,530.9**	1,897.6	571.5	624.0
15-Jun-96	3,067.0	2.1	3,069.1	58.3	28.5	120.8	6.2	213.8	264.1	**3,119.4**	1,967.3	505.3	649.0
16-Jun-96	3,520.0	2.6	3,522.6	153.2	30.5	264.9	7.5	456.0	263.8	**3,330.4**	1,846.2	1,768.2	489.0
17-Jun-96	6,835.0	2.5	6,837.5	241.0	41.3	1,858.1	7.8	2,148.2	266.7	**4,956.0**	1,782.9	10,636.3	701.0
18-Jun-96	12,177.0	0.8	12,177.8	113.7	34.7	719.1	7.3	874.9	259.0	**11,561.9**	1,801.1	3,402.1	318.0
19-Jun-96	5,013.0	1.2	5,014.2	170.4	40.5	401.0	7.3	619.2	257.2	**4,652.1**	1,769.1	1,885.3	196.0
20-Jun-96	4,668.0	0.9	4,668.9	212.9	49.0	296.6	7.6	566.1	261.0	**4,363.8**	1,870.8	1,414.5	486.0
21-Jun-96	4,603.0	1.2	4,604.2	191.4	28.2	226.4	7.7	453.7	258.0	**4,408.4**	1,875.7	1,024.1	477.0
22-Jun-96	3,582.0	1.0	3,583.0	56.3	49.7	150.5	7.2	263.7	260.8	**3,580.1**	1,880.3	703.8	617.0
23-Jun-96	4,336.0	1.6	4,337.6	40.1	35.8	146.8	7.4	230.0	257.5	**4,365.1**	1,769.9	633.9	426.0
24-Jun-96	3,361.0	1.0	3,362.0	146.7	59.5	223.1	7.3	436.6	259.5	**3,184.9**	1,821.5	710.4	474.0
25-Jun-96	3,299.0	1.3	3,300.3	53.7	36.4	128.3	7.5	226.0	255.9	**3,330.3**	1,837.5	471.5	581.0
26-Jun-96	3,459.0	2.4	3,461.4	39.9	62.0	109.0	7.6	218.5	264.4	**3,507.3**	1,966.0	361.1	633.0
27-Jun-96	2,657.0	3.1	2,660.1	109.8	27.2	120.5	9.0	266.6	264.4	**2,657.9**	2,071.8	376.2	632.0
28-Jun-96	3,341.0	3.4	3,344.4	40.1	31.5	91.9	7.8	171.4	269.4	**3,442.4**	2,330.8	297.0	618.0
29-Jun-96	2,995.0	4.5	2,999.5	58.6	29.2	91.8	8.8	188.4	268.9	**3,080.0**	2,429.2	285.6	589.0
30-Jun-96	3,007.0	2.2	3,009.2	37.2	39.8	78.9	10.1	166.0	271.8	**3,115.0**	2,454.1	210.3	543.0
Averages	4,563.7	1.4	4,565.1	119.3	35.3	328.9	7.6	491.1	261.1	**4,335.1**	1,860.1	1,580.7	536.8

Lake Michigan Diversion Accounting – WY 1996
July 1996 – Summary of Diversion Flows (All in cfs)

LAKE MICHIGAN DIVERSION ACCOUNTING WY 1996	ROMEOVILLE AVM GAGE RECORD	DIVERSIONS ABOVE THE GAGE	TOTAL FLOW THROUGH THE CANAL	GROUNDWATER PUMPAGE DISCHARGED INTO THE CANAL	WATER SUPPLY PUMPAGE FROM INDIANA REACHING THE CANAL	RUNOFF FROM THE DES PLAINES RIVER WATERSHED REACHING THE CANAL	LAKE MICHIGAN PUMPAGE BY FEDERAL FACILITIES DISCHARGED TO THE CANAL	TOTAL DEDUCTION FROM THE ROMEOVILLE GAGE RECORD	LAKE MICHIGAN PUMPAGE NOT DISCHARGED TO THE CANAL	**TOTAL DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS**	PUMPAGE FROM LAKE MICHIGAN ACCOUNTABLE TO THE STATE OF ILLINOIS	RUNOFF FROM THE DIVERTED LAKE MICHIGAN WATERSHED	DIRECT DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS
DATE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
01-Jul-96	3,146.0	2.9	3,148.9	101.4	43.4	94.4	9.4	248.5	337.1	**3,237.6**	2,389.0	210.8	852.0
02-Jul-96	3,221.0	2.7	3,223.7	41.5	44.8	71.7	7.8	165.8	333.6	**3,391.5**	2,185.3	169.9	989.0
03-Jul-96	3,173.0	2.5	3,175.5	57.2	40.7	105.6	9.3	212.7	333.2	**3,296.0**	2,180.8	186.6	1,002.0
04-Jul-96	3,004.0	2.2	3,006.2	99.2	38.2	84.9	8.3	230.7	332.5	**3,108.0**	2,124.5	185.4	1,027.0
05-Jul-96	2,959.0	3.0	2,962.0	56.7	41.1	67.0	9.1	174.0	332.1	**3,120.1**	2,238.4	139.1	937.0
06-Jul-96	3,078.0	3.2	3,081.2	54.8	36.2	62.4	8.5	161.9	337.9	**3,257.3**	2,347.5	139.9	969.0
07-Jul-96	3,128.0	2.5	3,130.5	37.2	45.4	52.3	9.0	143.9	342.4	**3,329.0**	2,453.9	105.5	957.0
08-Jul-96	2,967.0	2.7	2,969.7	107.6	43.0	71.1	8.8	230.4	347.6	**3,086.9**	2,439.7	141.1	718.0
09-Jul-96	2,895.0	1.7	2,896.7	41.9	60.8	48.1	10.0	160.8	338.5	**3,074.4**	2,266.1	86.1	930.0
10-Jul-96	2,850.0	1.8	2,851.8	61.3	43.7	51.0	10.0	165.9	340.4	**3,026.3**	2,275.1	95.4	914.0
11-Jul-96	2,976.0	2.6	2,978.6	84.5	44.6	56.1	9.4	194.6	340.6	**3,124.7**	2,368.3	99.8	904.0
12-Jul-96	2,716.0	3.7	2,719.7	58.2	40.9	45.9	10.6	155.7	340.5	**2,904.5**	2,390.9	86.7	896.0
13-Jul-96	3,272.0	3.7	3,275.7	50.6	43.8	40.5	9.4	144.3	336.9	**3,468.3**	2,395.8	73.7	959.0
14-Jul-96	2,971.0	2.6	2,973.6	84.9	41.2	61.3	8.7	196.2	338.3	**3,115.7**	2,293.6	186.0	966.0
15-Jul-96	2,549.0	3.6	2,552.6	111.0	43.1	58.9	10.5	223.4	330.7	**2,659.9**	2,165.0	253.6	859.0
16-Jul-96	3,202.0	3.4	3,205.4	53.5	33.3	36.8	9.9	133.4	332.3	**3,404.3**	2,273.4	124.6	885.0
17-Jul-96	7,878.0	1.9	7,879.9	70.0	33.9	3,549.1	9.0	3,662.0	351.0	**4,569.0**	2,157.8	16,389.9	294.0
18-Jul-96	17,202.0	1.1	17,203.1	102.3	69.6	3,905.3	9.5	4,086.6	339.8	**13,456.3**	1,902.5	16,209.7	34.0
19-Jul-96	13,947.0	0.5	13,947.5	125.6	74.5	959.4	9.0	1,168.4	326.0	**13,105.1**	1,947.0	6,034.5	117.0
20-Jul-96	8,423.0	0.5	8,423.5	223.7	70.3	652.9	9.0	955.9	324.8	**7,792.4**	1,881.3	3,553.0	189.0
21-Jul-96	7,060.0	0.6	7,060.6	305.9	37.7	460.7	8.6	812.9	320.1	**6,567.7**	1,741.4	2,219.9	646.0
22-Jul-96	4,842.0	0.7	4,842.7	257.4	34.9	310.9	8.7	611.9	327.6	**4,558.4**	1,904.3	1,572.0	779.0
23-Jul-96	5,050.0	0.8	5,050.8	129.9	35.6	187.3	8.4	361.3	331.6	**5,021.2**	2,005.2	993.3	1,014.0
24-Jul-96	3,998.0	0.9	3,998.9	58.0	35.5	204.1	9.3	306.9	332.1	**4,024.0**	1,984.0	820.6	797.0
25-Jul-96	4,040.0	0.7	4,040.7	56.7	38.2	132.2	9.3	236.5	332.7	**4,136.9**	1,978.2	571.7	953.0
26-Jul-96	3,887.0	0.9	3,887.9	101.5	42.5	120.3	9.9	274.1	332.3	**3,946.1**	2,018.9	439.8	964.0
27-Jul-96	4,047.0	0.6	4,047.6	102.0	50.5	200.0	9.6	362.2	330.3	**4,015.7**	1,955.7	707.0	690.0
28-Jul-96	4,028.0	0.9	4,028.9	226.9	38.3	452.4	9.2	726.8	322.1	**3,624.1**	1,766.1	1,458.3	377.0
29-Jul-96	4,411.0	0.9	4,411.9	185.0	37.5	304.9	8.9	536.3	329.0	**4,204.6**	1,866.5	1,470.4	815.0
30-Jul-96	6,536.0	0.8	6,536.8	206.0	48.9	1,243.6	9.4	1,507.9	322.5	**5,351.4**	1,850.9	3,218.9	658.0
31-Jul-96	4,420.0	0.9	4,420.9	181.6	34.5	274.7	8.0	498.9	326.3	**4,248.3**	1,862.4	1,023.5	825.0
Averages	4,770.2	1.9	4,772.1	110.8	44.1	450.5	9.2	614.6	333.6	**4,491.1**	2,116.4	1,902.1	771.5

Lake Michigan Diversion Accounting – WY 1996
August 1996 – Summary of Diversion Flows (All in cfs)

LAKE MICHIGAN DIVERSION ACCOUNTING WY 1996	ROMEOVILLE AVM GAGE RECORD	DIVERSIONS ABOVE THE GAGE	TOTAL FLOW THROUGH THE CANAL	GROUNDWATER PUMPAGE DISCHARGED INTO THE CANAL	WATER SUPPLY PUMPAGE FROM INDIANA REACHING THE CANAL	RUNOFF FROM THE DES PLAINES RIVER WATERSHED REACHING THE CANAL	LAKE MICHIGAN PUMPAGE BY FEDERAL FACILITIES DISCHARGED TO THE CANAL	TOTAL DEDUCTION FROM THE ROMEOVILLE GAGE RECORD	LAKE MICHIGAN PUMPAGE NOT DISCHARGED TO THE CANAL	**TOTAL DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS**	PUMPAGE FROM LAKE MICHIGAN ACCOUNTABLE TO THE STATE OF ILLINOIS	RUNOFF FROM THE DIVERTED LAKE MICHIGAN WATERSHED	DIRECT DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS
DATE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
01-Aug-96	4,291.0	0.8	4,291.8	61.7	55.5	167.7	9.6	294.4	306.7	**4,304.2**	1,890.0	578.8	1,003.0
02-Aug-96	3,572.0	0.9	3,572.9	42.3	53.8	121.6	9.0	226.6	309.1	**3,655.4**	1,994.4	398.4	993.0
03-Aug-96	3,776.0	1.8	3,777.8	59.3	59.6	103.7	8.1	230.6	314.6	**3,861.8**	2,012.3	306.6	1,004.0
04-Aug-96	3,194.0	3.0	3,197.0	91.2	58.7	100.8	8.1	258.8	314.2	**3,252.5**	2,035.9	267.2	1,014.0
05-Aug-96	3,370.0	3.0	3,373.0	57.7	51.1	83.9	10.1	202.8	318.4	**3,488.7**	2,301.1	208.3	893.0
06-Aug-96	3,559.0	2.6	3,561.6	101.4	51.0	117.8	11.0	281.2	316.8	**3,597.2**	2,470.7	335.7	1,183.0
07-Aug-96	3,569.0	4.7	3,573.7	52.3	45.7	114.2	11.2	223.4	313.0	**3,663.3**	2,563.2	306.4	793.0
08-Aug-96	3,962.0	3.3	3,965.3	175.6	48.8	198.6	9.2	432.2	313.1	**3,846.2**	2,173.4	705.2	815.0
09-Aug-96	3,227.0	2.2	3,229.2	52.4	52.9	74.4	8.6	188.3	309.7	**3,350.6**	2,094.3	202.4	435.0
10-Aug-96	3,765.0	2.4	3,767.4	41.4	58.9	62.7	9.0	172.0	312.2	**3,907.7**	2,088.8	131.6	1,171.0
11-Aug-96	3,566.0	2.6	3,568.6	52.0	53.1	60.8	8.6	174.5	306.2	**3,700.4**	1,924.8	120.9	1,165.0
12-Aug-96	3,003.0	3.3	3,006.3	85.7	43.9	66.7	8.9	205.1	310.4	**3,111.6**	2,101.1	133.9	1,169.0
13-Aug-96	3,284.0	4.1	3,288.1	55.9	44.3	54.6	9.0	163.9	314.6	**3,438.9**	2,245.0	110.6	1,117.0
14-Aug-96	3,021.0	4.1	3,025.1	72.7	46.0	57.1	10.2	185.9	315.4	**3,154.6**	2,236.0	126.5	1,077.0
15-Aug-96	3,221.0	3.4	3,224.4	85.4	53.9	58.4	10.5	208.3	313.5	**3,329.6**	2,174.2	113.5	1,199.0
16-Aug-96	3,173.0	3.1	3,176.1	39.9	45.3	41.6	9.3	136.1	315.3	**3,355.3**	2,158.7	80.1	1,153.0
17-Aug-96	3,094.0	3.0	3,097.0	46.1	52.2	41.0	9.1	148.4	315.1	**3,263.7**	2,164.7	69.0	1,136.0
18-Aug-96	3,419.0	3.1	3,422.1	77.3	48.0	71.6	9.3	206.1	315.2	**3,531.2**	2,044.7	119.4	781.0
19-Aug-96	2,953.0	4.1	2,957.1	58.5	42.9	46.0	9.9	157.3	311.2	**3,111.0**	2,032.0	98.7	883.0
20-Aug-96	2,777.0	3.9	2,780.9	65.3	45.0	45.8	10.5	166.6	308.6	**2,922.9**	2,089.8	99.1	1,022.0
21-Aug-96	3,196.0	3.6	3,199.6	81.5	44.2	48.8	9.0	183.5	308.1	**3,324.2**	2,199.5	104.4	838.0
22-Aug-96	4,357.0	4.0	4,361.0	44.1	42.4	142.2	9.0	237.8	317.7	**4,441.0**	2,229.8	4,966.0	816.0
23-Aug-96	4,567.0	4.4	4,571.4	231.4	51.7	139.0	9.4	431.4	304.5	**4,444.4**	1,961.5	858.3	1,434.0
24-Aug-96	3,993.0	4.3	3,997.3	237.8	44.1	107.7	9.1	398.7	306.7	**3,905.3**	2,007.0	229.7	1,040.0
25-Aug-96	3,861.0	3.5	3,864.5	47.0	35.2	39.2	8.9	130.2	308.0	**4,042.3**	2,008.2	76.2	1,067.0
26-Aug-96	3,331.0	3.9	3,334.9	40.1	42.1	32.8	9.3	124.3	312.5	**3,523.1**	2,136.8	51.2	1,083.0
27-Aug-96	3,340.0	4.0	3,344.0	70.2	50.1	39.4	9.2	168.9	312.0	**3,487.1**	2,152.3	67.7	1,105.0
28-Aug-96	3,264.0	4.1	3,268.1	66.3	50.7	35.3	9.0	161.3	309.1	**3,415.9**	2,153.1	57.0	1,154.0
29-Aug-96	2,987.0	4.2	2,991.2	54.2	46.8	30.5	9.5	140.9	311.8	**3,162.0**	2,161.1	51.2	1,145.0
30-Aug-96	3,132.0	4.0	3,136.0	74.0	45.4	35.6	11.0	166.0	315.0	**3,285.0**	2,200.5	61.3	1,162.0
31-Aug-96	3,009.0	3.8	3,012.8	95.8	45.3	40.4	9.3	190.7	316.7	**3,138.8**	2,189.1	63.8	1,169.0
Averages	3,446.2	3.3	3,449.5	77.9	48.7	76.8	9.4	212.8	312.1	**3,548.8**	2,135.3	358.0	1,032.9

Lake Michigan Diversion Accounting – WY 1996
September 1996 – Summary of Diversion Flows (All in cfs)

LAKE MICHIGAN DIVERSION ACCOUNTING WY 1996	ROMEOVILLE AVM GAGE RECORD	DIVERSIONS ABOVE THE GAGE	TOTAL FLOW THROUGH THE CANAL	GROUNDWATER PUMPAGE DISCHARGED INTO THE CANAL	WATER SUPPLY PUMPAGE FROM INDIANA REACHING THE CANAL	RUNOFF FROM THE DES PLAINES RIVER WATERSHED REACHING THE CANAL	LAKE MICHIGAN PUMPAGE BY FEDERAL FACILITIES DISCHARGED TO THE CANAL	TOTAL DEDUCTION FROM THE ROMEOVILLE GAGE RECORD	LAKE MICHIGAN PUMPAGE NOT DISCHARGED TO THE CANAL	**TOTAL DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS**	PUMPAGE FROM LAKE MICHIGAN ACCOUNTABLE TO THE STATE OF ILLINOIS	RUNOFF FROM THE DIVERTED LAKE MICHIGAN WATERSHED	DIRECT DIVERSION ACCOUNTABLE TO THE STATE OF ILLINOIS
DATE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
01-Sep-96	3,478.0	3.8	3,481.8	52.6	40.4	26.3	8.6	127.9	300.2	**3,654.0**	2,149.7	42.5	1,241.0
02-Sep-96	2,955.0	3.8	2,958.8	39.9	40.7	21.2	8.9	110.6	302.0	**3,150.2**	2,212.8	33.5	1,251.0
03-Sep-96	3,585.0	3.6	3,588.6	46.4	39.5	21.7	8.9	116.5	301.2	**3,773.3**	2,230.1	62.3	1,182.0
04-Sep-96	3,081.0	3.7	3,084.7	89.8	38.3	34.9	10.8	173.8	301.5	**3,212.4**	2,265.0	91.1	1,210.0
05-Sep-96	3,330.0	3.9	3,333.9	47.6	37.3	20.4	11.4	116.7	300.2	**3,517.4**	2,261.5	33.5	1,232.0
06-Sep-96	3,467.0	3.7	3,470.7	54.6	39.5	22.2	9.5	125.9	300.1	**3,645.0**	2,256.1	40.8	1,235.0
07-Sep-96	3,633.0	3.8	3,636.8	215.0	38.9	76.0	8.5	338.4	297.5	**3,595.9**	2,093.2	727.5	1,043.0
08-Sep-96	3,863.0	2.9	3,865.9	164.9	34.3	155.5	8.9	363.5	300.0	**3,802.4**	1,983.7	2,259.7	632.0
09-Sep-96	3,625.0	3.3	3,628.3	331.5	34.9	142.8	9.0	518.3	292.3	**3,402.3**	1,934.4	476.1	1,056.0
10-Sep-96	3,829.0	3.5	3,832.5	39.9	36.7	27.7	9.3	113.5	290.6	**4,009.6**	1,968.2	59.9	1,370.0
11-Sep-96	4,324.0	3.7	4,327.7	165.0	35.8	622.1	9.2	832.2	292.9	**3,788.4**	1,947.6	1,129.1	1,054.0
12-Sep-96	4,197.0	1.8	4,198.8	57.9	37.1	36.8	8.9	140.7	288.4	**4,346.5**	1,834.8	146.2	1,376.0
13-Sep-96	3,617.0	1.9	3,618.9	55.2	38.2	28.6	9.0	131.0	287.2	**3,775.1**	1,814.4	67.9	1,172.0
14-Sep-96	3,312.0	1.9	3,313.9	37.2	39.7	18.9	9.1	104.9	287.9	**3,496.9**	1,814.3	34.3	1,165.0
15-Sep-96	3,171.0	1.7	3,172.7	75.2	40.6	29.3	8.8	154.0	288.7	**3,307.5**	1,796.8	52.3	1,165.0
16-Sep-96	3,165.0	2.0	3,167.0	101.0	42.1	36.2	8.9	188.2	289.2	**3,268.0**	1,852.8	62.0	1,183.0
17-Sep-96	3,129.0	2.4	3,131.4	55.7	42.8	20.7	8.7	128.0	293.5	**3,296.9**	1,891.3	30.6	1,207.0
18-Sep-96	3,093.0	2.9	3,095.9	40.0	45.3	15.7	8.7	109.7	290.8	**3,277.0**	1,905.4	24.3	1,136.0
19-Sep-96	2,885.0	3.0	2,888.0	105.0	39.0	34.9	9.1	188.0	289.7	**2,989.7**	1,928.6	61.8	998.0
20-Sep-96	2,776.0	2.6	2,778.6	40.1	32.4	14.8	9.0	96.3	290.9	**2,973.2**	1,883.1	25.4	874.0
21-Sep-96	2,883.0	2.1	2,885.1	56.6	33.1	19.1	8.8	117.6	285.1	**3,052.6**	1,821.3	32.3	970.0
22-Sep-96	3,268.0	4.0	3,272.0	56.0	31.5	19.1	8.7	115.3	285.6	**3,442.3**	1,821.9	35.2	996.0
23-Sep-96	3,014.0	3.4	3,017.4	93.6	32.8	30.5	9.0	165.8	287.2	**3,138.9**	1,869.9	56.5	800.0
24-Sep-96	3,035.0	3.1	3,038.1	37.2	33.1	12.2	8.3	90.8	284.5	**3,231.7**	1,793.6	20.4	948.0
25-Sep-96	3,001.0	2.9	3,003.9	109.1	27.7	34.8	8.2	179.8	284.7	**3,108.8**	1,809.2	58.5	901.0
26-Sep-96	5,478.0	1.7	5,479.7	81.5	36.4	1,432.1	8.4	1,558.4	297.0	**4,218.3**	1,740.6	9,983.7	539.0
27-Sep-96	7,510.0	2.1	7,512.1	233.6	35.2	316.6	7.6	593.0	282.3	**7,201.4**	1,704.7	2,010.6	563.0
28-Sep-96	4,457.0	1.8	4,458.8	339.7	25.3	187.4	7.4	559.9	282.7	**4,181.6**	1,706.2	522.0	854.0
29-Sep-96	3,777.0	2.2	3,779.2	84.5	20.8	71.7	8.0	184.9	281.6	**3,875.8**	1,679.8	202.5	851.0
30-Sep-96	3,249.0	2.5	3,251.5	37.2	25.4	38.7	8.7	110.0	284.8	**3,426.3**	1,766.2	103.3	887.0
Averages	3,606.2	2.9	3,609.1	98.1	35.8	119.0	8.9	261.8	291.3	**3,638.6**	1,924.6	616.2	1,036.4